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EXHIBITION
OF THE
PRODUCTS OF ALL NATIONS
IN
THE
PROSPECTUS
EXHIBITORS.

EXHIBITION

THE GREAT INTERNATIONAL EXHIBITION OF 1876
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EXHIBITION
OF THE
WORKS OF INDUSTRY OF ALL NATIONS,
1851.

PROSPECTUSES
OF
EXHIBITORS.

VOL. IV.

MACHINERY.

CLASS VII.—CIVIL ENGINEERING, ARCHITECTURE, AND BUILDING
CONTRIVANCES.

VIII.—NAVAL ARCHITECTURE, MILITARY ENGINEERING,
GUNS, WEAPONS, &c.

COLLECTED UNDER THE AUTHORITY OF THE
Royal Commissioners.

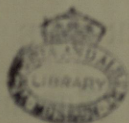
EXHIBITION
OF THE
WORKS OF INDUSTRY OF ALL NATIONS
1851

PROSPECTUSES
OF
EXHIBITORS.

MACHINE

GENERAL—CIVIL ENGINEERING, ARCHITECTURE, AND BUILDING
CONSTRUCTION
THE GREAT ARCHITECTURE, CIVIL ENGINEERING
GENERAL

COLLECTED UNDER THE AUTHORITY OF THE



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MACHINERY.

CLASS VII.

**CIVIL ENGINEERING, ARCHITECTURE, AND BUILDING
CONTRIVANCES.**

EXHIBITION OF 1851.

ALPHABETICAL LIST
OF
EXHIBITORS' PROSPECTUSES.

VOLUME IV.

CLASS 7.

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Bauge, Ainié
Clive, J. H.
Cochrane,
Croggon, and Co.
Ell, George
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Hadley, C.
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Lacarrière, A.
McNeill, F. and Co.
Quincey, Harcourt
Remington
Townley, William
Tuckey, R.
Wilkins, W. C.
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CLASS 8.

Baker, Thomas K.
Béringer,
Bernard, Albert
Bertonnet,
Claudin, F.

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Erskine,
Fairman, J.
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Hubbard, Charles
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Jeffery, Walsh, and Co.
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Rodgers, Lieutenant William
Shaw, John
Shorman, John
Silver, S. W., and Co.
Sturdee, A. W.
Trail, Chasemore, and Co.

The names marked thus * have not furnished a sufficient number of
Prospectuses to render the series complete.

Exhibited at the Great Exhibition, Hyde Park,
Class VII, No. 197.

A SYSTEM OF PIPES,
ADAPTED TO HOUSES,
RENDERING THE BUILDING FIRE-PROOF,
PROVISIONALLY REGISTERED, MAY 1st, 1851,
INVENTED BY MR. W. BAIN, 141, HIGH HOLBORN.

THE model represents a two-story house, a main pipe placed up the one corner of building attached beneath ground to main water pipe or reservoir, and charged with water on the high pressure system; beneath the joists on each floor is placed water-proof pipes, communicating with the main pipe by one cross pipe on each floor; attached to the main pipe are small hose with taps, the which may be closed in a cupboard and used on ordinary occasions for domestic purposes. The water is turned on by a main tap at the lower part of the house. In case of fire occurring, the whole of the pipes are full of water, that if the fire reach the ceiling on either floor, it will cause a body of water to fall from each pipe the fire touches, thereby preventing all further extension and staying its own ravages. The small hose attached to the main pipe would be of the greatest service in case of fire being observed shortly after its first ignition, for by a judicious use of the water the fire might, in many instances, be entirely extinguished in less time than it would take to raise an alarm and bring assistance. In factories where steam is used, by the addition of an extra main tap above the water tap, the use of steam might be employed instead of water. By the adoption of this invention, it would be an impossibility for a house or factory to be destroyed by fire, and thereby be the saving of many lives, and much valuable property.

The adoption of this principle for protection from fire is more particularly beneficial to all churches, mansions, factories, farms, barracks, &c., situated at a distance from towns where there are no fire engine station to lend assistance in cases of need, and expressly in factories where steam is in constant use.

A NEW MACHINE,

FOR SAVING LIFE AND PROPERTY FROM SHIPWRECK OFF THE COAST.

INVENTED BY MR. W. BAIN, 141, HIGH HOLBORN.

PROVISIONALLY REGISTERED, MAY 1st, 1851,

THE model is on the scale of half-inch to a foot ; it represents a platform resting on piles driven into the ground. The machine is a double lift or windlass, the upper drum working a cable to tug any vessel or craft to the shore if in a disabled state, the lower drum working a constant communication with the wreck. The means of reaching the wreck is by firing a shot from a long gun, the shot attached to a line, and the line to the blocks which are working on the cables ; the machine rests on a turn table, which may be turned to any point.

The advantages of this invention are, that in case of a vessel being in distress off the coast, a line of communication may be instantly made. If the vessel is not in too distressed a condition, it may be tugged on shore by the cable worked on the upper drum ; or boats heavily laden may be brought on shore by the same means, whilst the endless cable working on the lower drum would be constantly bringing small boats with passengers or cargo from the wreck to the shore.

The working of such a machine is perfectly new, and if brought into practice would be the means of saving the lives of many hundreds who now meet with a watery grave ; the saving of property is certainly beyond calculation. The expence of working it would be but small, as they might be both guarded and worked, whilst they would form a kind of station for the present coast-guard service.

In case of a vessel being wrecked at any considerable distance from the station where the machine is erected, the turn table and gun may be placed on a light truck made for the purpose, and run along the coast to a point opposite to the wreck. The advantages of this invention are, the saving of life and property in positive danger without risking the lives of those who are already safe, and a more speedy and effectual means of accomplishing the desired object. The turn table with double windlass and long gun may be used from a vessel to the shore, and therefore should be fitted in every vessel for use in case of accident off a coast, from which no assistance could be attained, and would likewise be of great service in sighting a vessel in distress at sea, when it might be impossible to bear down upon her or send boats to her assistance. Where there is objection to the use of shots, Mr. BAIN has invented a new bolt and chain for projecting from the gun.

THE NEW YORK

FOR THE YEAR 1847

OF THE YEAR 1847

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OUVRAGES SUR LES ARTS ET LES SCIENCES

Architecture, — Mécanique, — Sculpture, — Peinture, etc.

Catalogue divisé en trois parties :

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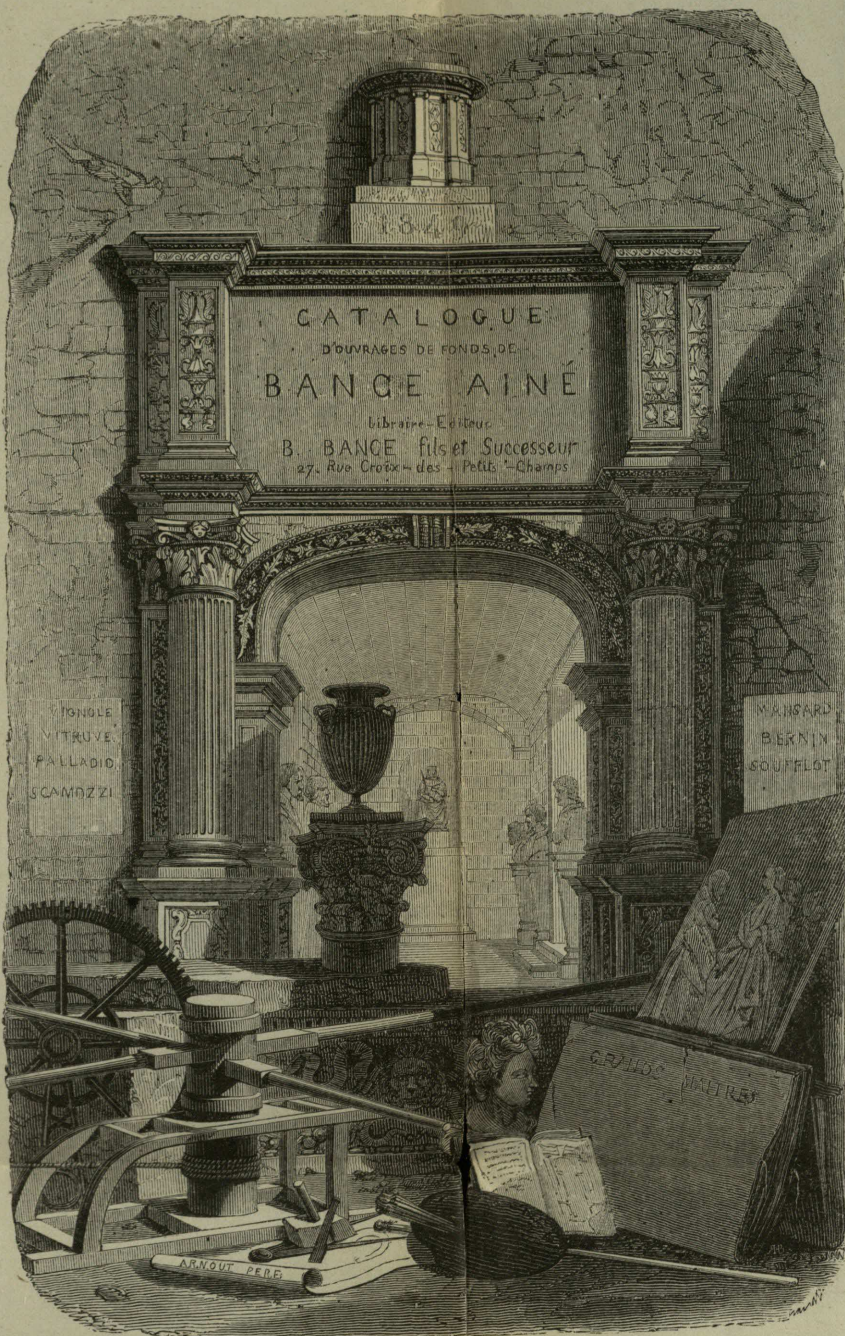
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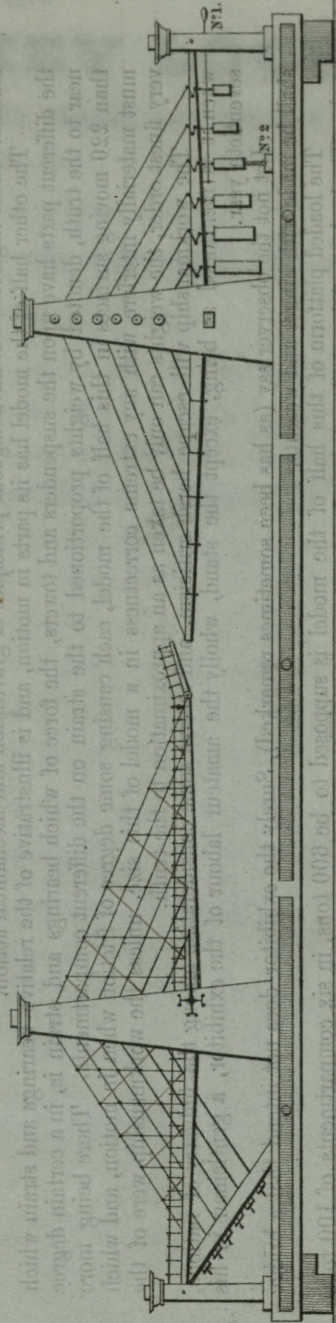
PEINTURE ET SCULPTURE.

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B. BANCE, rue Croix-des-Petits-Champs, 25, A PARIS.

Paris. — Imprimerie Bonaventure et Ducessois.

GREAT EXHIBITION, 1851.



MODEL OF A SUSPENSION BRIDGE,

IN MAHOGANY AND BRASS,

CALLED THE

BAR-TRELLIS SUSPENSION,

Four Feet Four Inches Long.

This Model is intended to exemplify and illustrate an improved principle for Suspension Bridges, substituting for the generally used flexible chain principle a tapering, rigid, and nearly inflexible one, gradually decreasing in the dimensions of the materials from the bases of the towers to the tops, like the bole and branches of a tree, which first gave the idea of this bridge.*

I consider the present Chain Suspension Bridges (though beautiful as picturesque erections) as built on principles very low in the scale of science, occasioning an imperfection of strength and duration, and a great waste of materials.

Let any one passing over Hammersmith and Hungerford Bridges observe the vast disproportion between the main chains and the pendent rods on which those bridges really hang. From an eye estimate of the chains of Hungerford Bridge (which is only for foot-passengers), I believe the chains to exceed 600 tons, whilst the perpendicular rods by which the bridge really hangs cannot amount to 20 tons.

I object to the present chain bridges, first, because the *whole* weight of the bridge and load, which is supported by the pendent rods, hangs from the *tops* of the towers, which must be the weakest parts, and subject to the greatest vibration; secondly, because the whole bridge and load are suspended from *chains*, which are always more than the whole length of the river span, and which must be of sufficient strength to bear their own great weight in addition to the weight of the bridge and load, and which chains, being loose in so many places, occasion or give liberty to oscillation, which continually agitates the weakest parts of the towers, and must tend in time to disintegrate them, and also present but little resistance to an undulation of the platform. It was said that the platform of the Menai Bridge, in the tempest of 1839, undulated sixteen feet perpendicularly, and was torn to pieces in many places.

Bridges after this model are intended to be constructed on tapering principles throughout all the main parts, to be as rigid and inflexible as conveniently may be, to have the longest suspenders much the lightest, to have all the suspenders well braced together, to lay the weight on the towers gradually upwards, having the lightest possible load at the top, to have a *drawbridge* in the centre when the navigation of the stream requires it, and to allow of the two sides being constructed independently of each other, and without other scaffolding than what is formed by their own progressive structure.

A bridge of the common construction, with (as in this model) twenty-four suspenders from the main chains, would lay about five-sixths of the whole weight on those chains, and on the *tops* of the towers. In this model of twenty-four rigid suspenders immediately from the towers, the weight is gradually distributed as the towers rise, and only about one-twelfth of the whole weight laid on the long suspenders at the *tops* of the towers.

EXPLANATION OF THE MODEL.

One-half of the model represents a moiety of a bridge, firmly and gradually suspended from the tower by rigid bars, well braced together, and screwed or bolted down to earth-ties in the strongest manner, with a drawbridge at the

* In the year 1839 I saw a large cat walk along the slender, horizontal bough of a young beech-tree, and from the end pass to the like bough of another tree in the plantation. I was surprised at the very small deflection of the bough, and thought these boughs formed a complete suspension-bridge. I went and examined the tree, and tested the bough as to the weight it would bear, and considered how the bough was supported, and how I could best make such a bough artificially. The bough, as we all know, thickens and has firm hold of the bole of the tree, and the bole firm hold of the ground by its widely-spread roots. It immediately occurred to me, that to obtain *breadth* for a road without extra weight I must make the bough *hollow*, and, like a telescope, taper, with either a passage through it or on it; but what would be the best, I mean the most *economical*, mode of imitating the firm ground-roots of the tree? This I found would be best effected by passing a *rod* from the light end of the bough-tube to the upper part of the bole, and thence pinning it to the ground on the other side; and by often repeating this process towards the thick end of the bough-tube, I found I could obtain a rigid gangway, and sustain it by a trellis of rods, with less metal than what constituted the sides and top of the tube, and joinings to the bole.

end, and windlass or capstan for raising the same when needed. The wood is meant to represent the platform, and the lead upon it the greatest load, equally distributed, it will ever have to sustain. The upright braces are intended to give greater rigidity, and to connect the different suspenders together, so that no part of the structure will depend on one set of suspenders alone. The side braces, or struts, are intended to represent some mode of giving to any lateral impulse, such as the wind, a point of resistance against the base of the tower.

Let it not be supposed that this model is intended as a miniature facsimile of a real bridge, in dimensions, joinings, &c., for a workman to copy; it is only meant as an exemplification of principles. It is not to show to masons the forms of towers and pillars, nor to smiths and carpenters how to join iron and wood together; it is to elucidate some neglected but advantageous principles of gravitation and mechanical action.

The other half of the model has its parts in motion, and is illustrative of the relative bearings and strain which the different parts have upon the suspenders and towers, the force of which bearings and strain is, in a certain degree near to the truth, denoted by weights proportioned to the strain on the different compartments. There being more than 220 moving surfaces in this half of the model, each causing some degree of friction when in motion, and which must materially interfere with any extreme correctness in a model of this size, unless the workmanship were of the very finest order, the weights can only be taken as an approximation to the truth.

The workmanship will escape harsh criticism, and receive some consideration among the industry of nations, when it is mentioned as being, except the stand, wholly the amateur labour of the exhibitor, a gentleman in his seventieth year.

Let not the observer say (as has been sometimes remarked), Surely the exhibitor does not intend that a bridge shall be made with hinges and weights.

The loaded platform of this half of the model is supposed to be 600 tons, in six compartments of 100 tons each. The leaden weights represent a total of 1236 tons, in a series decreasing from the tower in the geometrical ratio of 4, 8, 16, 32, 64; the weight supporting the compartment farthest from the tower being 124 tons less than the weight which supports the compartment nearest to the tower.

Gently ease the weights by means of either or both of the levers, Nos. 1 and 2, or in any other way, and the platform will fall, the weights not being very much more than sufficient to counterbalance it, and by pressing down the end lever, No. 1, it will put down the weights, and restore the platform to its level.

The extra weight of the support over the load (viz., 1236 to support 600) is owing partly to friction, but chiefly to the obliquity or indirect action of the strain, which presses partly downward and partly horizontally against the base of the tower, and cannot, *not* need it, be omitted. Of course, in a real bridge as much further weight, that is strength, will be given to the supporters as may be thought needful,—probably trebled.

The weight of the platform and load, 600 tons, taken when pressing in the line of gravity only, may be considered as thus distributed:—

On the tower direct	-	-	-	-	-	98 $\frac{1}{2}$ tons.
On the 1st rod	-	-	-	-	-	98 $\frac{1}{2}$ tons.
On the 2nd rod	-	-	-	-	-	97 tons.
On the 3rd rod	-	-	-	-	-	93 $\frac{1}{2}$ tons.
On the 4th rod	-	-	-	-	-	87 $\frac{1}{2}$ tons.
On the 5th rod	-	-	-	-	-	75 tons.
On the 6th rod	-	-	-	-	-	50 tons.
Total	-	-	-	-	-	600 tons.

I find that about 616 tons, hung as counter weights against the two longest rods, Nos. 5 and 6, will just support the whole platform and load of 600 tons; and that 902 tons will do the same if hung against the two middle rods, Nos. 3 and 4; and that 2230 tons will do the same if hung against the two short rods, Nos. 1 and 2. In this last case there is a great inequality of leverage at work, as the weights act on the short arm of the lever.

One-half of a bridge like this would serve as a suspension pier or jetty, and might be built from scaffolding formed by itself progressively.

The power of having a drawbridge in the centre has been thought by some persons to be a valuable feature in this construction.

Any one in doubt as to the superiority of tensile rods over flexible chains may be satisfied by inspecting a suspension bridge over the Avon, at Tiverton, near Bath, built by Mr. Motley, C.E.

In proceeding to build a bridge on these principles, first estimate the maximum span at a minimum cost of a beam or bearer to carry horizontally a given weight, and let that be the greatest horizontal extent between the several suspenders; next estimate the weight of a tower to sustain firmly and gradually a given weight (the weight of the bridge and extreme load), and let that be the height of the towers. These estimates are to ascertain at what span and height the additional iron required to strengthen the suspenders.

The economical construction of a bridge, on the principles of this model, will mainly be ruled by the above items of span and height, as the longer the span of the platform beams the more of their weight is made to rest direct on the bases of the towers, and the higher the tower the nearer the suspenders approach perpendicularly, and consequently the less their required dimensions. If the half platform of this model were only a single span beam, with one pair of suspenders, then half the weight of 600 tons would rest direct on the base of the tower, viz., 300 tons, instead of 98 $\frac{1}{2}$ tons, as in the model.

I am of opinion that an iron hollow platform, tapering in thickness, and constructed with cells on the tension and compression principle adopted in the great Britannia tube, would prove very effective and economical as a roadway.

This model to be sold for the benefit of the Exhibition.

J. H. CLIVE,

12, Stanhope-place, Hyde-park, and Clanway Colliery, Tunstall, Staffordshire.

THE CATCH KEY LOCK,

PATENTED IN ENGLAND, FRANCE AND BELGIUM,

AT THE


Crystal Palace, Engineers' Department, Class 7, No. 158.

TEN SHILLING LOCK, & TEN THOUSAND POUNDS.

This ten shilling Lock will be manufactured as a challenge to all England, and is now offered as a challenge to the celebrated American who has picked a Lock made by Chubb, and offers to pick one made by Bramah. (See *Times*, June 9th and June 11th.) This Lock not only acts as a detector, but as a protector, and prevents innocent parties being accused. The pick or key on being applied is immediately secured, until the owner releases it; furthermore, should the owner lose the real key, or suspect counterfeit keys, he can, at any time, prevent the Lock being opened by any one but himself.

An important feature in this Patent consists in being able to fix it to any Lock, and rendering it perfectly secure.

Each person giving an order for a Lock, and paying for the same when ready for delivery, will be entitled, on the plan of the Art Union, to possess the Patent Right of Lock, which is valued at Ten Thousand Pounds.

 Orders received during the day at the Engineers' Department of the Exhibition, Class 7, No. 158, North West Gallery.

**CROGGON & Co., 2, DOWGATE HILL,
Near the Mansion House, LONDON.**

J. NEWTON, Printer, 10, Silver-street, Wood-street, Cheapside

THE TCH KEY LOCK,

REGISTERED IN ENGLAND, FRANCE AND BELGIUM.

AT THE

Patent Office, Engineers' Department, Class 7, No. 158.

MILLING LOCK, & TEN THOUSAND POUNDS.

A ten shilling Lock will be manufactured as a challenge to the all England, and is now offered as a challenge to the American who has picked a Lock made by Chubb, to pick one made by Barran. (See Times, June 9th 1881). This Lock not only acts as a detector, but also detects and prevents innocent parties being accused, or key on being applied is immediately secured, and owner releases it; furthermore, should the owner lose key or suspect counterfeit keys, he can at any time have the Lock being opened by any one but himself.

Important feature in this Patent consists in being it to any Lock, and rendering it perfectly secure. A person giving an order for a Lock, and paying for when ready for delivery, will be entitled on the plan of Union, to possess the Patent Right of Lock, which at Ten Thousand Pounds.

Orders received during the day at the Engineers' out of the Exhibition, Class 7, No. 158, North West

The extra weight of the support over the load (viz., 1236 to support 600) is owing partly to friction, but chiefly to the obliquity or indirect action of the strain, which presses partly downward and partly horizontally against the base of the tower, and cannot be removed.

SMOKE CONDENSED!

Fresh Air! New Motive Power!!

The Smoke of London and large towns condensed for agricultural and other useful purposes.

Fresh Air from some healthy position supplied to every house.

The consumption of Fuel saved full 50 per cent.

The ~~noxious~~ vapours now arising from gully holes much the cause of frequent epidemic) effectually prevented.

Each Member of the House of Lords and Commons enjoy the benefit of Hot or Cold Air without inconvenience to his neighbour.

Butchers' meat and other articles of food preserved during the hot months.

New Motive Power performs all these operations.

The Inventor is ready to treat with any Capitalist or person able and willing to form a Company. Profits calculated to produce 20 to 100 per cent.

ADDRESS:

CRYSTAL PALACE, Class 7, No. 158.

Covering Steam Boilers, Pipes, &c, preventing the radiation of heat, and **SAVING TWENTY FIVE PER CENT. OF FUEL.**

Samples, Testimonials, and full instructions, on application to

CROGGON & Co., 2, DOWGATE HILL, LONDON.

DIRECTIONS FOR APPLYING THE **PATENT ASPHALTE FELT.**

Felt can be laid on from gable to gable, or across the roof from eaves to eaves. It is essential that it should be stretched tight and smooth—overlapping full one inch at the joinings, closely nailing through the overlap, with “twopenny *fine* clout nails” (heated in a shovel, brown, when hot, into grease, to prevent rust), about $1\frac{1}{2}$ inches apart, but *copper nails* are *able*.

whole roof must have a good coating of **COAL TAR AND LIME** (about two gallons of tinner to six pounds of the latter), well boiled together, kept constantly stirring while boiling, put on *hot* with a common tar mop, and while it is soft some coarse sharp sand may be over it. The coating must be renewed every fourth or fifth year, or more or less frequently, according to the climate. The gutters should be made of two folds, one over the other, cemented over with the boiling mixture.

CROGGON & Co., 2, DOWGATE HILL,
Near the Mansion House, LONDON.

SMOKE CONDENSED! and Air! New Motive Power!

Smoke of London and large towns condensed for
domestic and other useful purposes.
The Air from some healthy position supplied to
houses.

Consumption of Fuel saved till 50 per cent.
Noxious vapours now arising from gully holes
the cause of frequent epidemics) effectually
removed.

Member of the House of Lords and Commons
pay the benefit of Hot or Cold Air without in-
curring to his neighbors.

Meat and other articles of food preserved
the hot months.

Motive Power performs all these operations.

Investor is ready to treat with any Capitalist or
other able and willing to form a Company. Profits
to produce 20 to 100 per cent.

Address:

STAL PARADE, Class 2, No. 158.

same when ready for delivery, will be entitled on the plan
the Art Union to possess the Patent Right of Lock, which
issued at Ten Thousand Pounds.

Orders received during the day at the Engineers,
Department of the Exhibition, Class 2, No. 158, North West

The extra weight of the support over the load (viz., 1250 to support 500) is owing partly to friction, but chiefly to the obliquity or indirect action of the strain, which presses partly downward and partly horizontally against the base of the tower, and cannot be avoided.

CHEAP, LIGHT, AND DURABLE ROOFING.



CROGGON'S

PATENT

ASPHALTE ROOFING FELT,

Has been extensively used and pronounced efficient, and particularly applicable for **WARM CLIMATES.**

It is a non-conductor. It is portable, being packed in rolls, and not liable to damage in carriage. It effects a saving of half the timber usually required. It can be easily applied by any unpractised person. From its lightness, weighing only about 42-lbs. to the square of 100 feet, the cost of carriage is small.

INODOROUS FELT,

For Damp Walls; and for Damp Floors, under Carpets or Floor-Cloths.

PRICE ONE PENNY PER SQUARE FOOT.

PATENT FELTED SHEATHING,

For Covering Ships' Bottoms, &c.,

DRY HAIR FELT,

For Covering Steam Boilers, Pipes, &c., preventing the radiation of heat, and **SAVING TWENTY FIVE PER CENT. OF FUEL.**

Samples, Testimonials, and full instructions, on application to

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The whole roof must have a good coating of **COAL TAR AND LIME** (about two gallons of the former to six pounds of the latter), well boiled together, kept constantly stirring while boiling, and put on hot with a common tar mop, and while it is soft some coarse sharp sand may be sifted over it. The coating must be renewed every fourth or fifth year, or more or less frequently, according to the climate. The gutters should be made of two folds, one over the other, cemented together with the boiling mixture.

CROGGON & Co., 2, DOWGATE HILL,

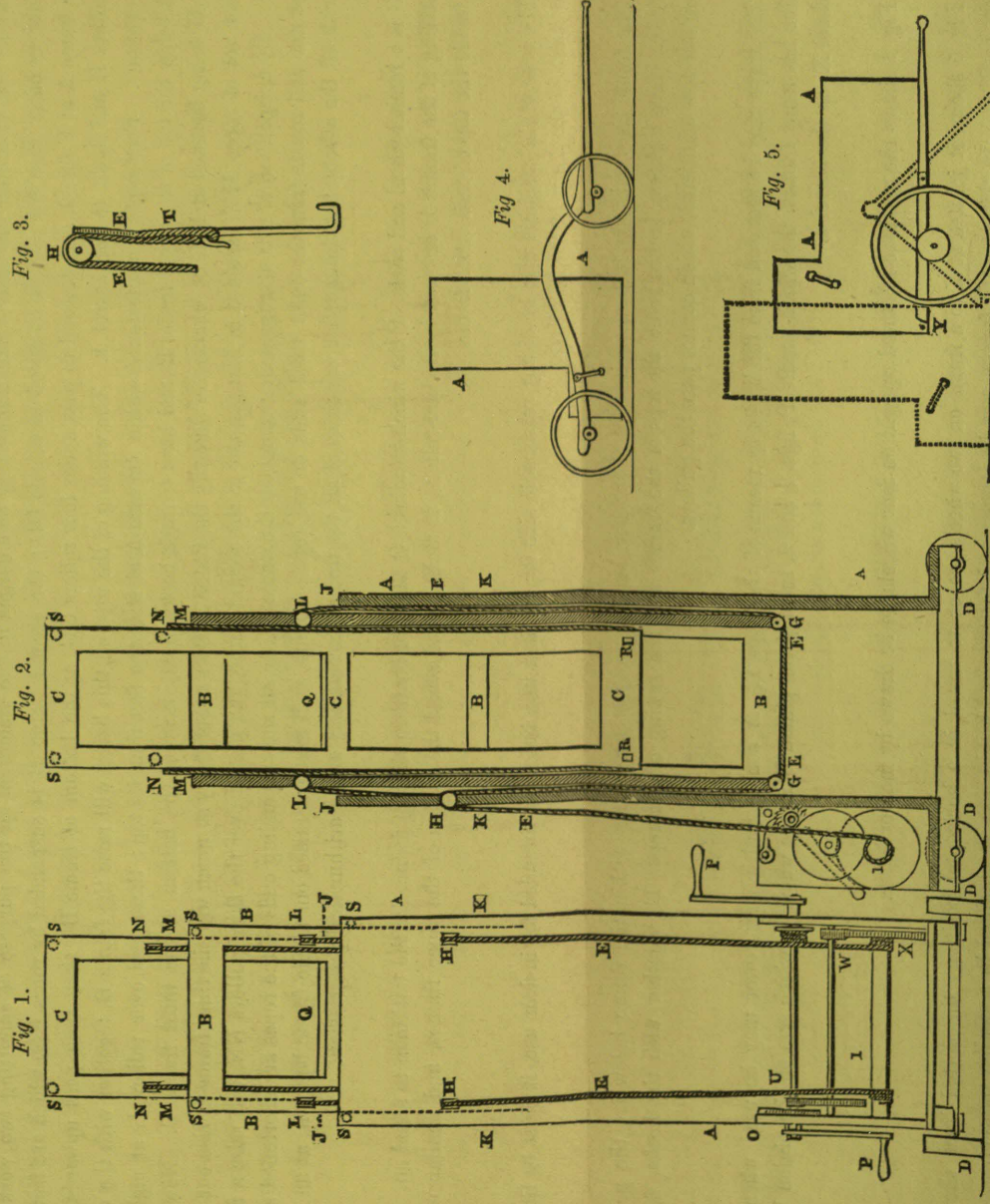
Near the Mansion House, LONDON.

GEORGE ELL'S

ADJUSTABLE SCAFFOLD, OBSERVATORY, OR FIRE ESCAPE.

Fig. 1.

Fig. 2.



Being an Improvement on Reeve's, which gained the Silver Medal and Five Pounds from the Society of Arts.—(See the *Transactions of the Society of Arts, Manufactures, Commerce, &c.*, vol. 53.)

This Machine is applicable to a variety of purposes, but is especially adapted to that of cleaning and decorating the walls and ceilings of lofty buildings, as it may be adjusted to any height within its range, and supports itself with safety independently of any attachment to the walls. The smallest, and of course the uppermost or innermost frame, is made capable of holding one or two men, who can be raised by one or two others to any height within seventy feet. A moveable platform, or a folding gallery, with handrails, may be added for the convenience of workmen, as the case may require; and with some modification of this part, the machine may be used as a fire escape. Ladders with handrails, one working within the other, are thrown out for

PROSPECTUS
OF THE
INVENTIONS AND IMPROVEMENTS

GEORGE ELL,

Nos. 3 & 6, TOTTENHAM COURT, NEW ROAD,

St. Pancras.

AS EXHIBITED IN THE
GREAT EXHIBITION

OF THE

Centennial of Industry,

HYDE PARK, 1851.

I.
MODEL OF ADJUSTABLE SCAFFOLD, OR
FIRE ESCAPE.

II.

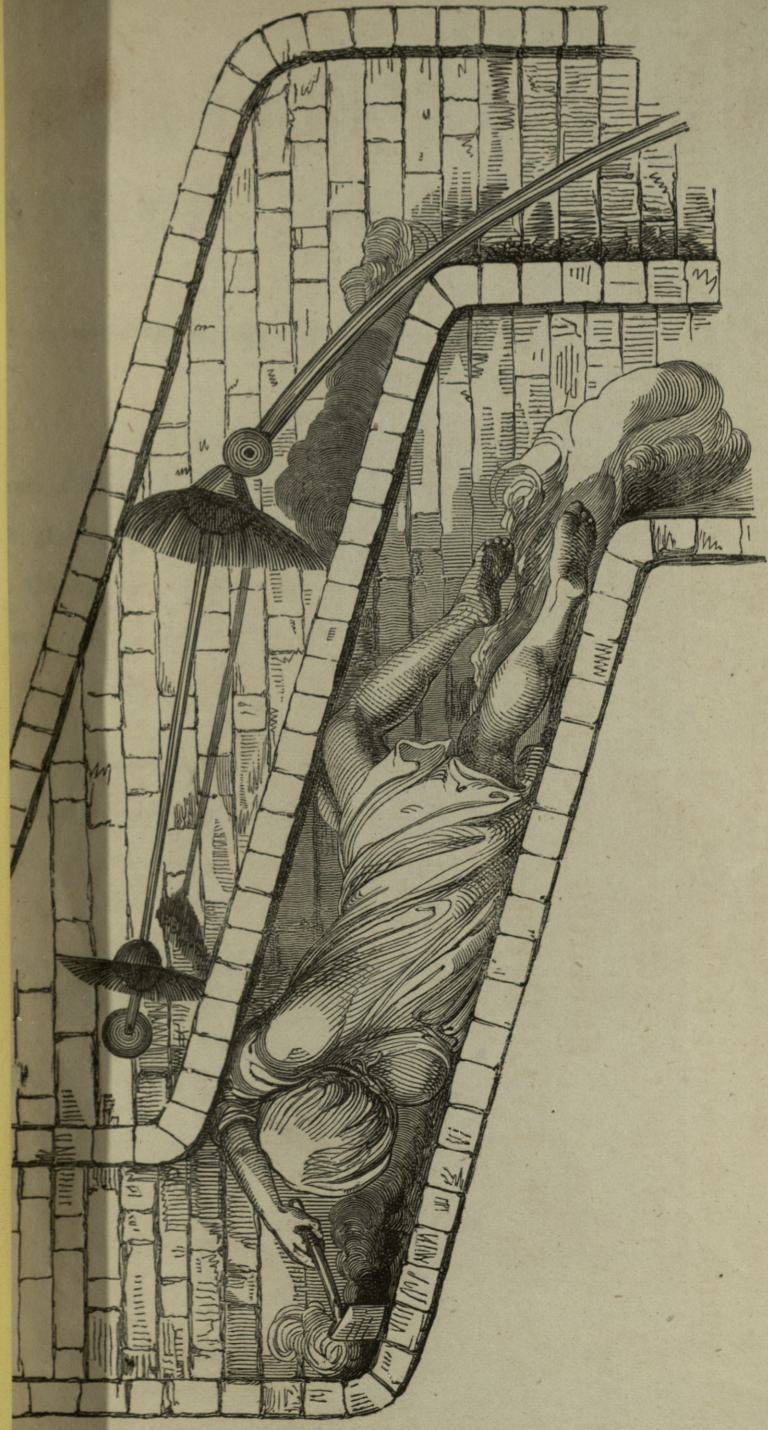
MODEL OF ADJUSTABLE LADDER.

III.

IMPROVED BARROW.

IV.

FOLDING STEPS.



THE

PATENT VULCAN MACHINE, FOR CLEANSING CHIMNEYS,

To which was awarded the Gold Medal by the Climbing Boys' Committee,

THE RIGHT HONORABLE THE EARL OF SHAFTESBURY, CHAIRMAN.

Indented and Manufactured by

S. F. EVERY ESQ., OF QUORNDON, NEAR DERBY.

This Machine is so constructed, that the little blocks containing whalebone, are allowed to bend downwards with ease during ascent, thus passing freely along the upper surface of slopes; whereas during descent, the blocks are on the contrary, held out firmly by a band of Vulcanised India Rubber, thereby causing the Machine to strain upon its universal joint, and take a lower position, thus sweeping the bottom surface of the slopes in a most effectual manner.

The above woodcut, represents the Prize Machine, with a small brush for cleansing pots, as it really appears when descending a slope of 110 degrees; also the helpless and fearful situation of a Climbing Boy during the same work.

Machines are made of different dimensions to order, varying in price according to circumstances, the more general size being 17 inches in diameter, Price £1 12s. to all licensed persons, or Companies, for general use. Private Families may obtain the same, to be used at their own houses, without license for £2, and canes, with sockets attached, for 2s. each, twenty or more being usually required.

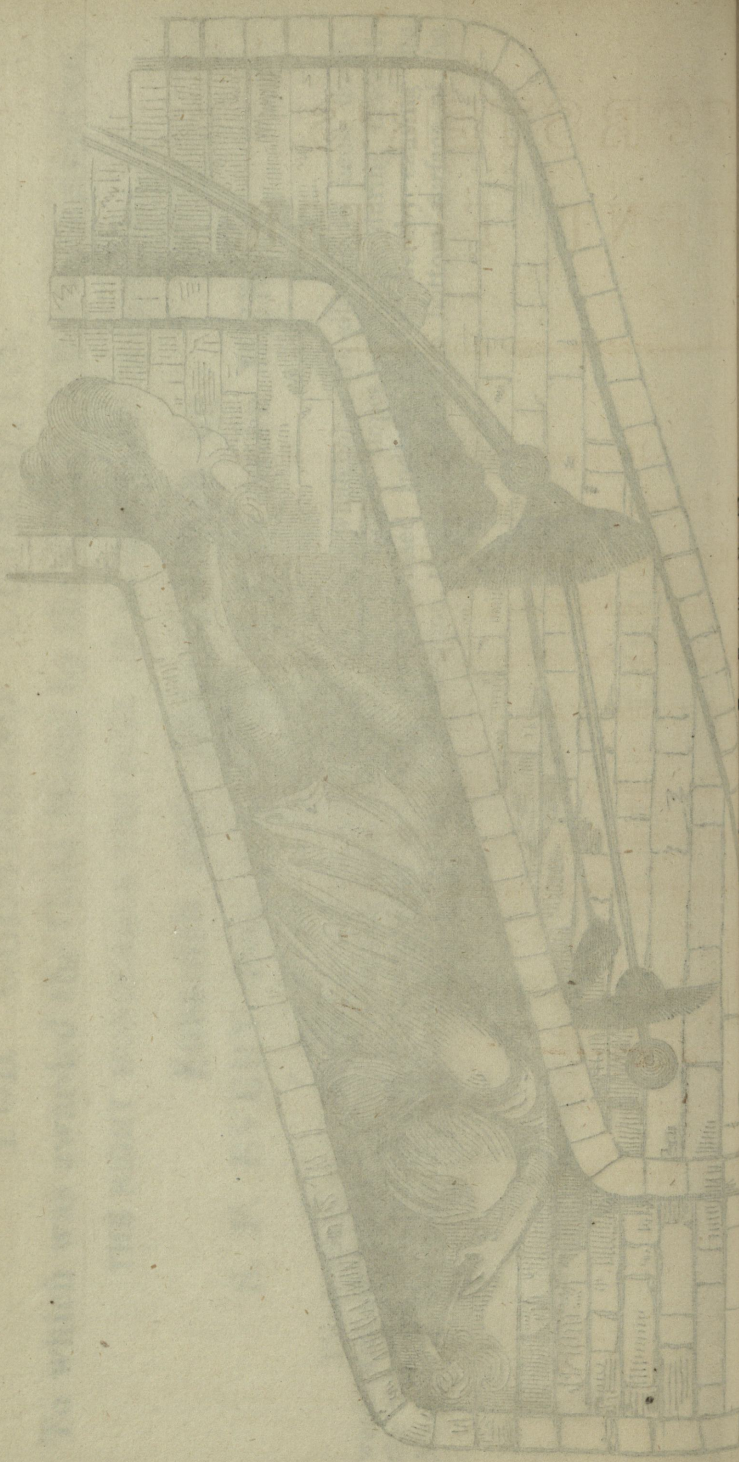
Machines for Cleansing the Flues round Steam Engine Boilers, Conservatories, &c. made to meet peculiar difficulties on receipt of particular information.

Drawings, containing the exact formation of difficult chimneys being forwarded, with every needful particular, advice will be given, on reasonable terms, as to the best method of relieving the same.

For further information, and to treat for Licenses, apply to the Manufacturer and Patentee, S. F. EVERY, Quorndon, Derby.

The basis of the human mind cannot be changed.

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FORSTER'S PATENT FILTER.

ON

These Filters are applicable for all the purposes of domestic use, requiring only to be attached to the Main which supplies the House. Separate Pipes, Cisterns, and Services are entirely done away with, and perfectly Pure Filtered Water can be drawn in any quantity directly from the Main.

The Filter is simple in construction, cheap in application, cannot get out of order, and only requires cleaning occasionally to ensure perfect action.

PATENTEE.—JAMES FORSTER,
5, South John Street, Liverpool.

MANUFACTURERS.—COCHRANE & Co., *Dudley.*

AGENT.—H. P. BURT, *50, King William Street, City, London*

S,

OF

T. UNDERWOOD, PRINTER, UNION PASSAGE, BIRMINGHAM.

the base of the tower and cannot be used for a

THE
FOR CLEANING

To which was awarded the Gold Medal in 1876

FORSTERS
TENT FILTER

These filters are made of all the
finest and purest materials and are
designed to remove all impurities from
the water which is used for drinking
and for other purposes. They are
made of a fine mesh of wire and are
designed to last for many years.
They are made in a number of sizes
and are suitable for use in all
kinds of buildings. They are
very cheap and are easily cleaned.

FORSTERS
TENT FILTER
COGNATE & Co. Dallas
T. BERT & Co. Dallas



C. HADLEY'S
IMPROVEMENTS IN THE CONSTRUCTION
AND
FORMATION
OF
PAVEMENTS AND SURFACES
FOR
CARRIAGE WAYS,
STREETS, & ROADS,
AS EXHIBITED IN THE
GREAT EXHIBITION OF INDUSTRY OF
ALL NATIONS, 1851.

CLASS 7, No. 91.

CHARLES HADLEY.
T. UNDERWOOD, PRINTER, UNION PASSAGE, BIRMINGHAM.

THE ADVANTAGES AND IMPROVEMENTS TO BE OBTAINED
DERIVED FROM THIS INVENTION ARE,

- 1—An Indestructible and Permanent Pavement.
- 2—Equality, Durability, and Solidity of the Work Surface.
- 3—An impossibility of wearing into corrugations or indentations.
- 4—Its non-liability to be affected by frost to the extent the present granite or wooden pavement is subject to.
- 5—The perfect ease with which Vehicles can pass over, also the comfort and ease to passengers travelling thereby, and consequently considerably decreased the wear and tear of such Vehicles, and also rattling noise when Vehicles are passing over.
- 6—A more Cleanly Surface, there being no interstices or hollows into which mud or filth can accumulate, or the numberless joints or crevices by or through which the dirt can work up from underneath the blocks to the surface.
- 7—A better and safer foothold for horses, and less slippery than the present granite or wood paving, or an enameled metal surface.
- 8—Its non-liability to frequent repairs and relaying (when once laid down.)
- 9—Its Cost, taking into consideration the considerable increase in the depth of the granite blocks to be used therein, compared with the depth of the granite blocks now generally used in the ordinary granite pavements; and also that the material (Cast-iron) forming the plates or boxes, when worn out by traffic can be re-used by melting and casting again, together with the improvements and advantages obtained therefrom, is favourable to its general adoption for heavy traffic.

N.B.—Corporations, Paving Committees, &c. requiring Drawings and Particulars may obtain them by communicating with the Inventor,

CHARLES HADLEY,

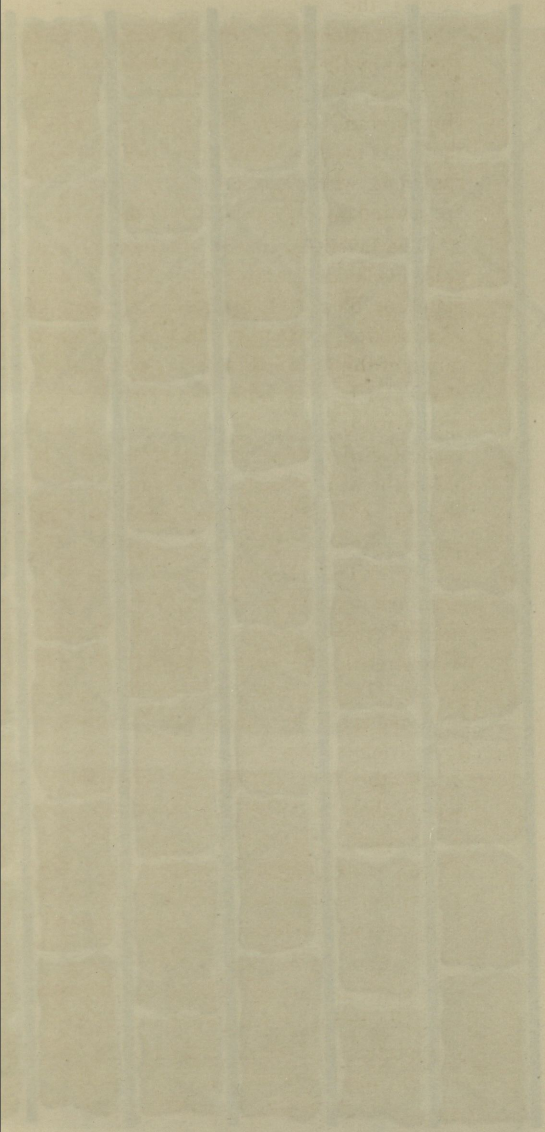
Lower Hurst-st., Birmingham

The Patent Right of this Invention for the Continental States to be disposed

THE object of this Invention is to obtain an indestructible pavement, to maintain throughout its duration an equal level and more durable working surface, and also to obviate the inequalities and corrugations which continually occur and form in such surfaces by the sinking of the stones or blocks in places, the effects of frost, and the chipping and wearing of the edges where the joints meet, which inequalities and corrugations, when once formed, or give way, are continually increasing in size and number.

The Invention consists in forming separate blocks of granite or wood into solid plates or blocks of any size, thickness, or areal section, by the introduction and application of thin cast-iron or other metal plates, frames, or boxes, cast so as to form a section of the road, with a series of thin cast-iron vertical girder division plates, so that the pavement will consist of a row or line of granite or wooden blocks, and a vertical girder division plate of metal alternately. The entire weight and wear is thrown upon these girder division plates and the centre of each stone or block, which is concreted into each of these boxes or grooves. The edges or jointing of these plates or blocks are to be formed with grooved or dovetail joints of angular, semicircular, square, or any other form or shape. The foundations of the road to be made solid previously to the plates, frames, or boxes being laid thereon, which plates or boxes will be laid in gravel or suitable concrete, and be allowed to become firm before being used for traffic.

Pavements constructed on this principle will require the granite blocks considerably less in depth than those now generally used. A proportionate decrease in the rattling noise common to granite pavement in general, is expected to be realized by the solidity and evenness of the surface.



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FIG. I.



FIG.2.

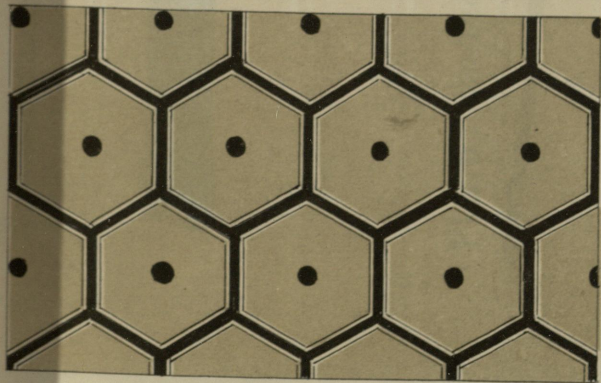


FIG.3.

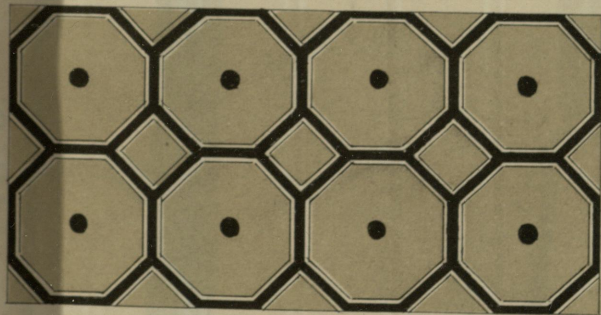
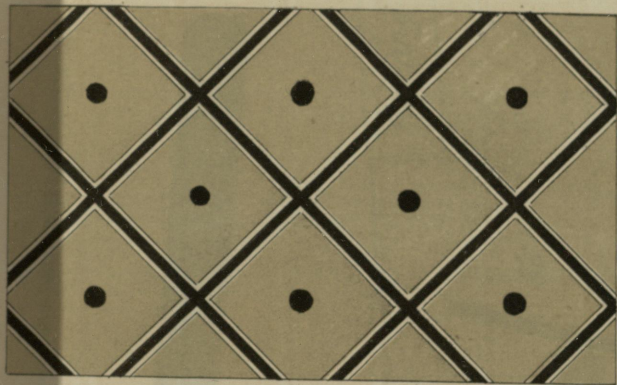


FIG.4.



the base of the tower and around the base of the tower



FIG. 1

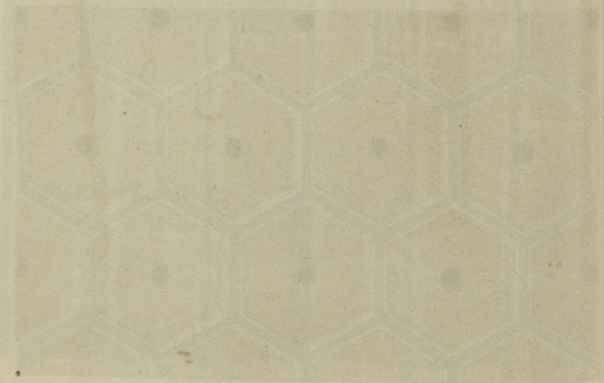


FIG. 6.

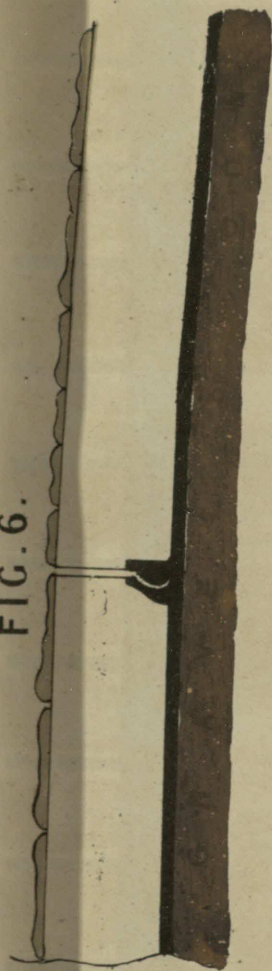
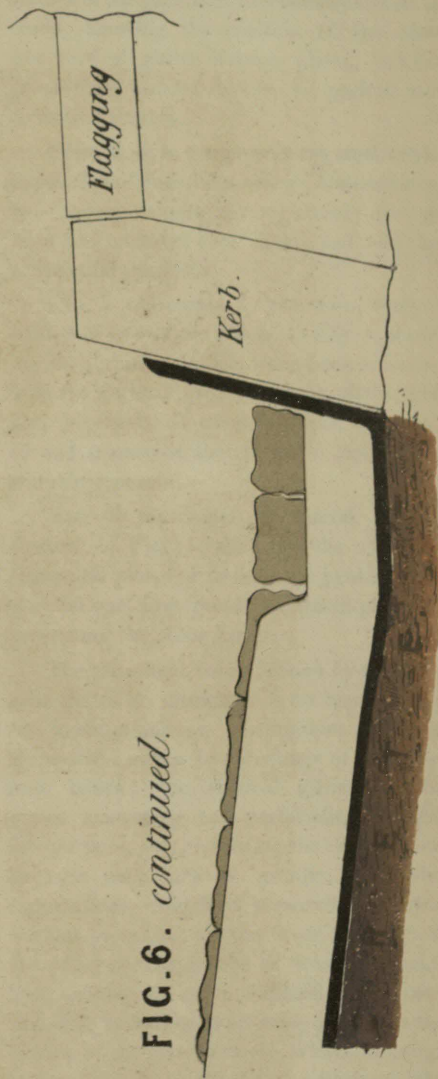


FIG. 6. continued.



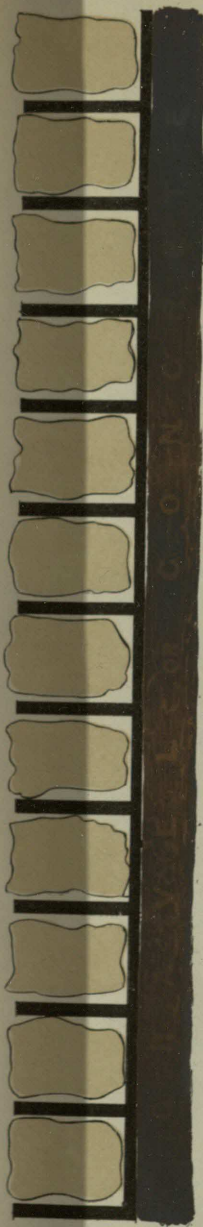


FIG. 1 represents the areal or working surface of the pavement for ordinary streets or roads, showing the position of the cast-iron vertical girder division plates, and the granite or wooden blocks as packed and concreted therein.

FIGS. 2, 3, & 4 represent the areal working surface of ditto for crossings, intersections, and squares, where several streets diverge from and intersect each other, and also for ornamental purposes.

FIG. 5 represents a transverse vertical section of two of the plates, as Fig. 1, showing the formation of the iron plates or boxes, with the vertical girder division plates, and also the granite or wooden blocks, as packed and concreted therein with asphalt or suitable concrete.

FIG. 6 represents a lateral vertical section of Fig. 1, shewing the cast-iron segmental plates or frames and jointing, and also the cast-iron gutter or shield-plate for preserving the stone kirbing.

The pavement being formed by the large solid plates or blocks, it is an impossibility for indentations or corrugations to form themselves, unless by breakage of the cast-iron boxes; the vertical girder division plates answering and performing a three-fold purpose, 1st, preventing the corrugations between each row of granite, and also indentations, therefore preserving an even surface by taking all the wear and tear off the edges of the granite or wooden blocks. 2nd, forming an extra foothold for horses. and 3rd, by acting as so many girders to the bottom of the plate or frame, which (although being thin) is enabled to withstand the violent concussion and jumbling of heavy traffic without danger of fracture.

HURWOOD'S PATENT APPARATUS



FOR MOVING AND FASTENING WINDOWS, &c.



A DESCRIPTION

OF

VARIOUS MODES OF APPLYING THE ABOVE INVENTION.

PRINTED BY MRS. F. PAWSEY, IPSWICH.

the first of the ~~travellers~~ and arrived at 3 1/2 p.m. 1883. The

HURWOOD'S PATENT APPARATUS



FOR MOVING AND FASTENING WINDOWS, &c.



A DESCRIPTION

OF

VARIOUS MODES OF APPLYING THE ABOVE INVENTION.

PRINTED BY MRS. F. PAWSEY, IPSWICH.

HURWOOD, PATENTEE,

IPSWICH,

*Of whom further particulars may be obtained, and
the terms upon which licenses are granted.*



HURWOOD'S PATENT APPARATUS

FOR

MOVING AND FASTENING WINDOWS, &c.

GENERAL DESCRIPTION.

This invention recommends itself in all its applications by its simplicity, efficiency, and certainty of action, and entirely dispenses with all Pullies, Weights, Cords, Springs, Set-opes, Fastenings, &c. A principal feature in the invention is the application of the Screw or Worm working into a Wheel or Rack, as a prime mover. The apparatus moves with ease and certainty; is very durable, not likely to be out of order; is perfectly secure in every position, and is applicable to Conservatories, French Casements, Folding Shutters, Ventilators, Skylights, Ship Scuttles, Deck and Stern Lights, and to all descriptions of Windows, and is particularly adapted to Public Buildings.

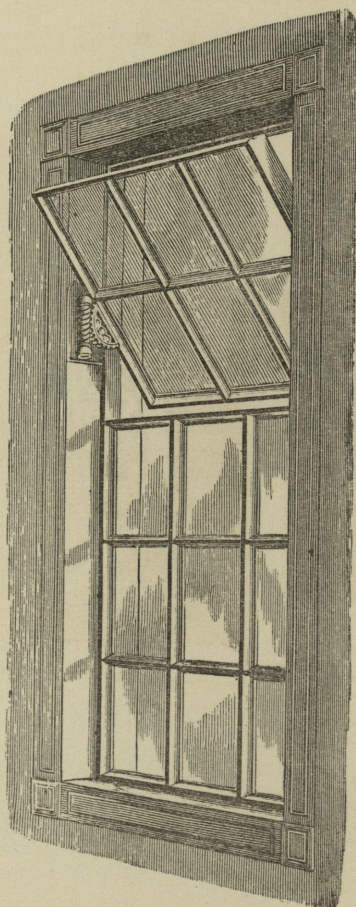
HURWOOD'S PATENT APPARATUS
FOR MOVING AND FASTENING WINDOWS, &c.

AS APPLIED TO PIVOT WINDOWS.

PLATE I. H.

Perspective View of a Window, part of which opens.

Fig. 1.



HURWOOD'S PATENT APPARATUS,

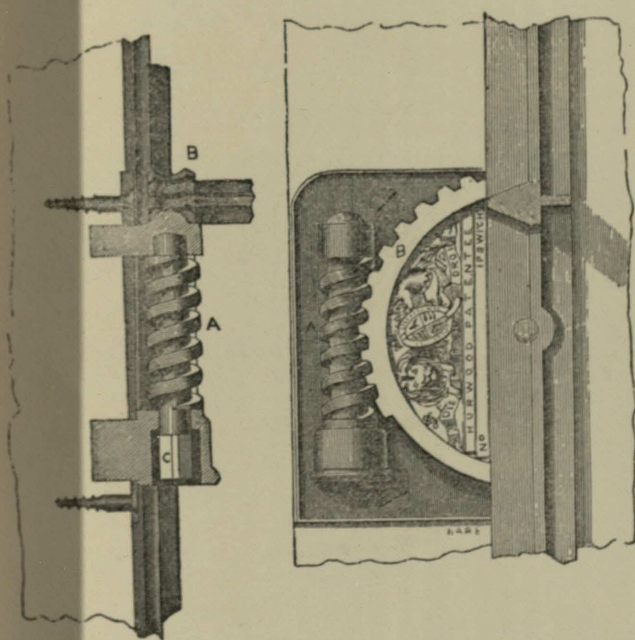
FOR MOVING AND FASTENING WINDOWS, &c.

AS APPLIED TO PIVOT WINDOWS.

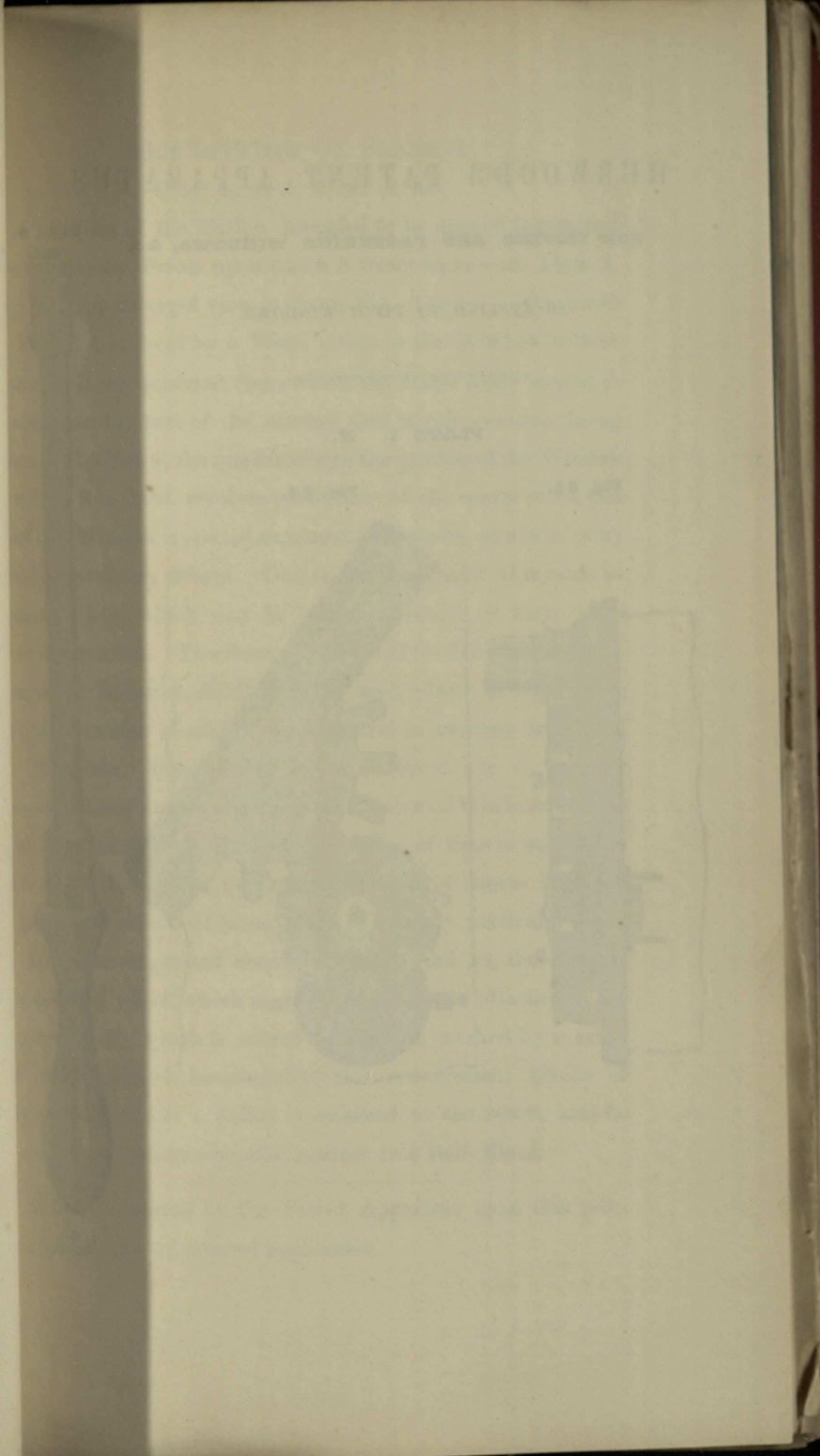
PLATE I. H.

Fig. 3.

Fig. 4.



the lower of the two windows and a small window in the middle of the lower of the two windows



HURWOOD'S PATENT APPARATUS,

FOR MOVING AND FASTENING WINDOWS, &c.

AS APPLIED TO PIVOT WINDOWS.

PLATE I. H.

Fig. 21.

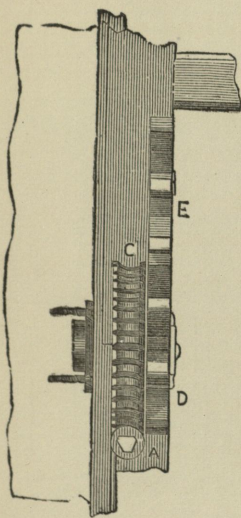


Fig. 22.

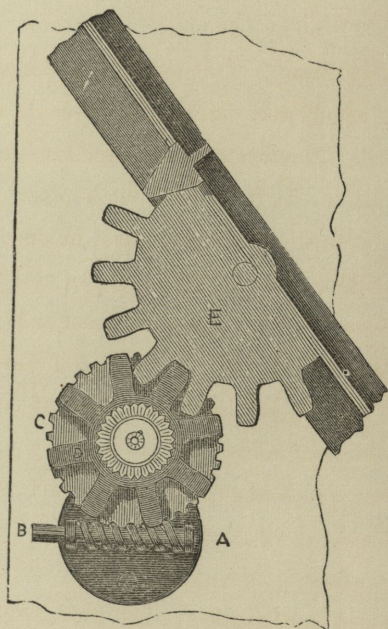


Fig. 23.



DESCRIPTION OF PLATE I.

FIG. 1, 3, 4, 5, 21 & 22.

The part of the window intended to be opened is attached to its frame by Pivots upon which it freely turns—see Plate I, Fig. 1. An enlarged view is shewn Fig. 3 and 4. The screw or Worm A is fixed by a Plate, either to the Window or Sash Frame.—B the quadrant (into which the Screw freely works) is attached to the part of the window that moves—motion being given to the Screw, the quadrant with the portion of the Window to which it is fixed, revolves partly around the centre pivot, and thus the Window is opened or closed at pleasure, and is in every position perfectly secure. One end of the Screw C is made to receive a key, which may be either moveable or fixed as is most convenient. The former is preferred for Lunatic Asylums, Houses of Industry, &c. it being in such places of importance that the inmates should have no control in opening or closing the Windows. One kind of key is shewn at Fig. 5, they are also sometimes made (where a great number of Windows require to be frequently opened, and the saving of time is an object) with a small crank at the lower end, and of course the kind of key used admits of being made to suit any particular place.

In the arrangement shewn in Fig. 21 and 22, there is part of a toothed wheel, which is either cast upon or attached to the opening sash; which is moved by a pinion worked by a screw and wheel placed horizontally; this arrangement admits of easy fixing, and if a pulley is attached to the screw, may be opened by a cord in a similar manner as a Roll Blind.

Windows moved by the Patent Apparatus upon this principle admit of very general application.

HURWOOD PATENT APPARATUS

FOR MOVING AND POSITIONING WRITING

U. S. PATENT OFFICE

Be it remembered that on the 15th day of January, 1880, I, HURWOOD, of the County of ... State of ... have invented certain new and useful Improvements in ... and I hereby declare that the following is a full and exact description of the same, reference being made to the accompanying drawing, in which—

Fig. 1 is a perspective view of the apparatus, showing the ...

Fig. 2 is a plan view of the ...

Fig. 3 is a side elevation of the ...

Fig. 4 is a detail view of the ...

Fig. 5 is a detail view of the ...

Fig. 6 is a detail view of the ...

Fig. 7 is a detail view of the ...

Fig. 8 is a detail view of the ...

Fig. 9 is a detail view of the ...

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Fig. 92 is a detail view of the ...

Fig. 93 is a detail view of the ...

Fig. 94 is a detail view of the ...

Fig. 95 is a detail view of the ...

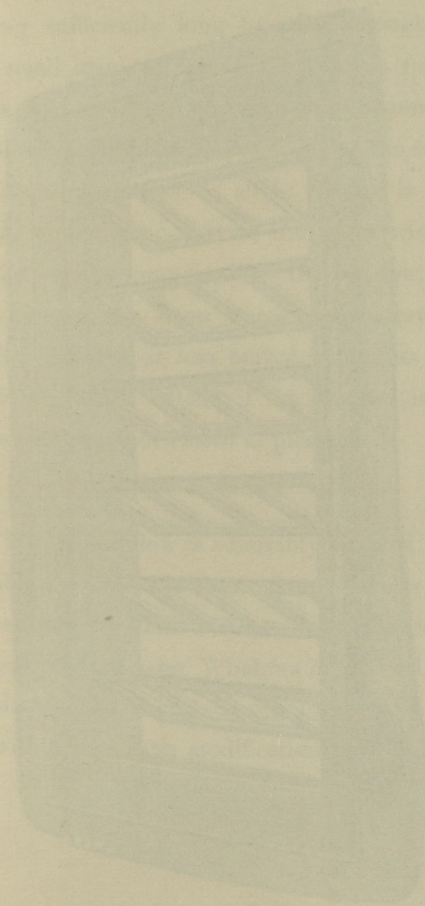
Fig. 96 is a detail view of the ...

Fig. 97 is a detail view of the ...

Fig. 98 is a detail view of the ...

Fig. 99 is a detail view of the ...

Fig. 100 is a detail view of the ...

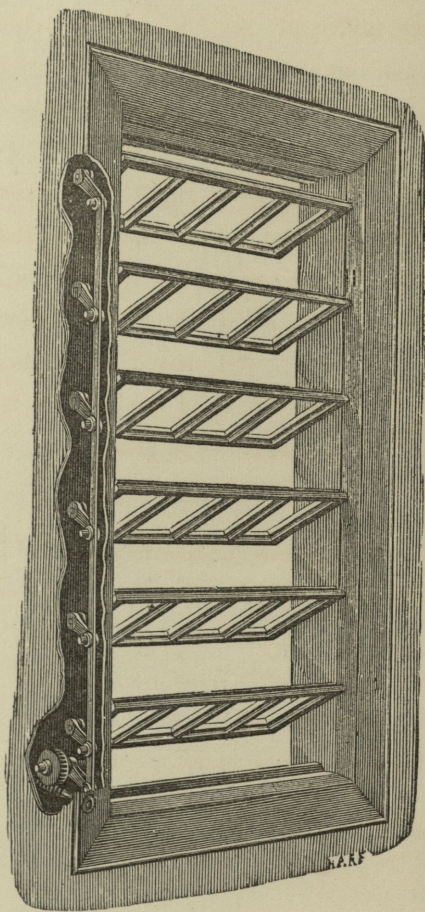


HURWOOD'S PATENT APPARATUS
FOR MOVING AND FASTENING WINDOWS, &c.

AS APPLIED TO PIVOT WINDOWS.

PLATE II. H H.

*Perspective View of a Window, where the whole is
made to open.*



DESCRIPTION OF PLATE II.

By reference to the Drawing it will be seen that in this instance the Window is divided into as many portions as there are panes in height—each part turns upon two pivots, one of them being sufficiently long to pass through the frame to receive a small crank (a part of the frame is removed to show the cranks, &c.) A screw and portion of a screw wheel is fixed at the bottom of the frame independant of the sashes, to which a crank is also connected—a slight flat rod is attached to the crank fixed to the same axis as the screw wheel, and also to each of the cranks connected to the window, so that when motion is given to the screw wheel by the screw being turned, the window is more or less moved, and thus from the least portion to the whole extent of the window is under perfect control and is opened or closed at pleasure.

This kind of window is admirably adapted to places where considerable ventilation is required, and admits of being placed in any position—for Plant Houses the frames are usually placed in a vertical position—for Windows in general the frames are usually placed horizontally—it can likewise be advantageously applied with a very little modification to open extensive Sky-lights.

DESCRIPTION OF PLATE II

By reference to the Diagram it will be seen that in this
case the Window is divided into as many portions as there
are panes in height—each pane being upon two pivots, one of
which being sufficiently long to pass through the frame to
leave a small crank at end of the pane is removed to show
the position of a crank at end of a pane which is fixed
to the frame of a pane which is attached to the
crank is also removed—a crank is also attached to the
end fixed to the pane which is the pane which and also to
end of the crank connected to the window so that when
turn is given to the crank which is the crank being turned,
the window is raised or lowered and thus from the front
view is the whole extent of the window in under position
and may be raised or lowered in position.

This kind of window is admirably adapted to places where
ventilation is required in winter and in summer of being placed
any position—In winter the window may be usually placed
in vertical position—In summer it is usually placed
horizontally placed—In winter it is usually placed
horizontally with a view to the sun and in summer it is
usually placed vertically with a view to the sun.

HERWOOD'S PATENT APPARATUS

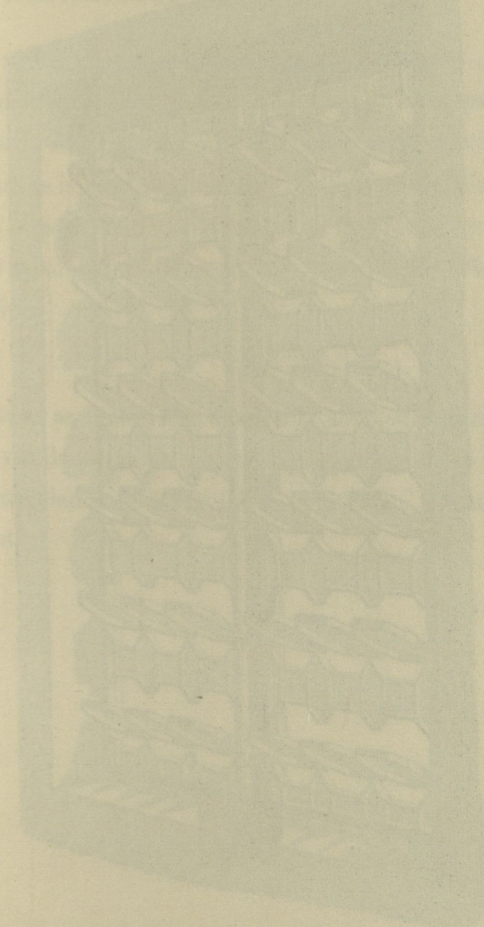
FOR MOTING AND PASTORING WINDOWS

AS APPLIED TO MOVING WINDOWS

STATE OF NEW YORK

Providence Place of a Window, where it is put in
made in 1880

HERWOOD'S PATENT APPARATUS



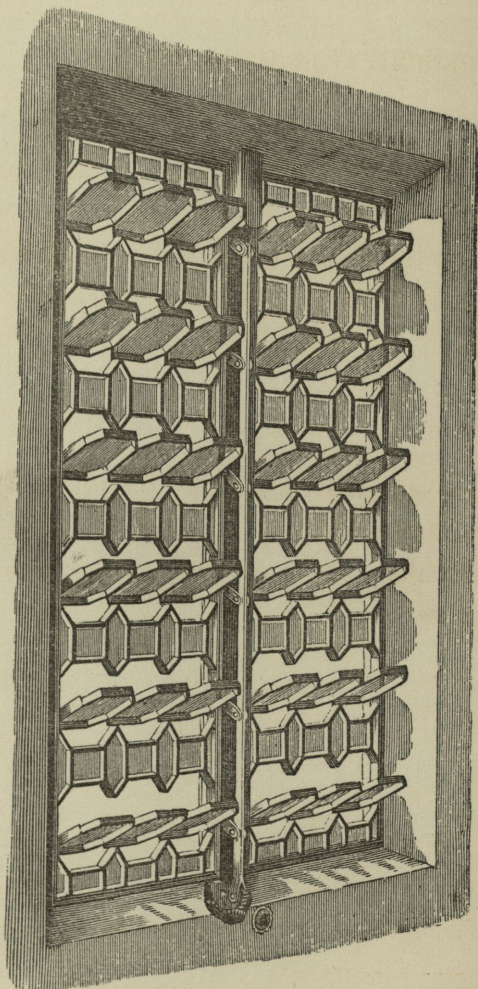
HURWOOD'S PATENT APPARATUS

FOR MOVING AND FASTENING WINDOWS, &c.

AS APPLIED TO PIVOT WINDOWS.

PLATE III. H H O.

Perspective View of a Window, where it is partially made to open.



DESCRIPTION OF PLATE III.

This Window is opened and closed by a similar apparatus as is employed in Plate II, the only difference being that in this case the apparatus is fixed to the centre mullion of the Window, and the parts of each Window intended to be opened are connected to one apparatus, which serves to open the two Windows simultaneously.

This Window as Plate II, is admirably adapted to situations where good ventilation is an object, by opening in so many parts a free circulation of air is induced, without producing a strong current.

EVEREDS PATENT APPARATUS

FOR THE PURPOSE OF IMPROVING THE METHOD OF

VENTILATING ROOMS AND BUILDINGS

AND THE METHOD OF

VENTILATING ROOMS AND BUILDINGS

DESCRIPTION OF PLATE III

The Window is shown in Fig. 1, and is a single apparatus
employed in Fig. 1, the only difference being that in this
apparatus is fixed to the outside of the Window,
each of which Window is provided with a con-
struction which serves to open the Window

The Window as shown in Fig. 1 is substantially identical in construction
and construction is an object of opening in so many
the circulation of air is induced without producing a

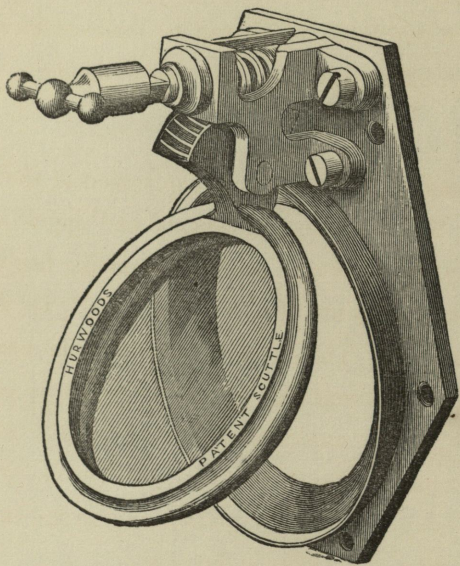
HURWOOD'S PATENT APPARATUS,

FOR MOVING AND FASTENING WINDOWS, &c.

AS APPLIED TO SHIPS' SCUTTLES.

PLATE IV.

Perspective View of a Ship's Scuttle.



DESCRIPTION OF PLATE IV.

A strong screw or worm is secured to the back plate of the Scuttle by a bracket—the Cone or moveable part is also fixed to the bracket by a centre pin, upon which it turns; a tangent quadrant is fitted to the cone with a thread cut into it to correspond with the Screw, into which it works, and by its operation the Scuttle is opened or closed to any extent at pleasure—when closed it is firmly held to its seat by the screw, and the parts being well fitted and ground together, it is perfectly secure and water tight. The Scuttles are usually fitted with moveable keys, which can be removed to prevent them from being improperly opened in case of danger.

The value and importance of the application of the invention for Ship's Scuttles is best understood and appreciated by those who know the value and necessity of giving free ventilation to the close apartments of a Ship, particularly for Passenger Steam Ships, &c. The Patent Scuttle may be opened to any extent by any person, and in every position is perfectly secure and safe; and is unlike the Common Scuttle, which as soon as it is liberated from its seat has nothing to keep it in a fixed position, but is always liable to be swinging and knocking about by the motion of the ship or the wind.

the base of the lower and upper ...

DESCRIPTION OF PLATE IV

The ... of ... is ... to the back plate of the ...
... the Cone or movable part is also fixed ...
... to the cone with a ... it is to ...
... into which it works, and by its ...
... of ... to any extent at ...
... it is ... to its rest by the ...
... and the parts being well fitted and ground together, it ...
... the ... are usually ...
... which can be removed to prevent ...
... of ...

The ... and ... of the ...
... and ... by ...
... and ...
... of a ... for ...
... The ... may be opened to ...
... and is ...
... which as ...
... to keep it in a ...
... and ...
... of the ship or the wind.

HURWOODS PATENT ATTACHMENT

FOR MOVING AND TAPERING WINDOWS

AS APPLIED TO RECTANGULAR AND CIRCULAR

FIG. 1. Cross Section of a Window

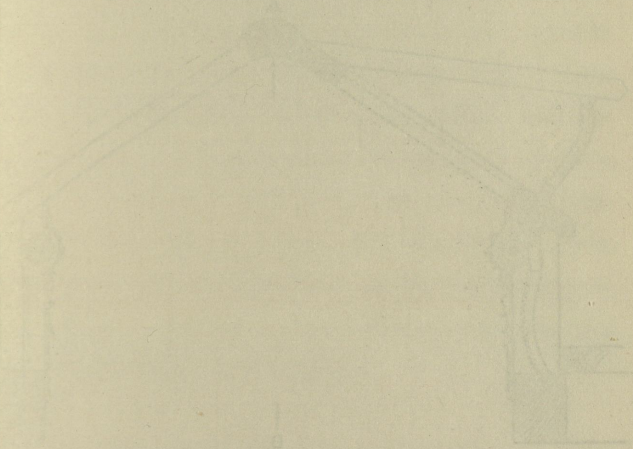
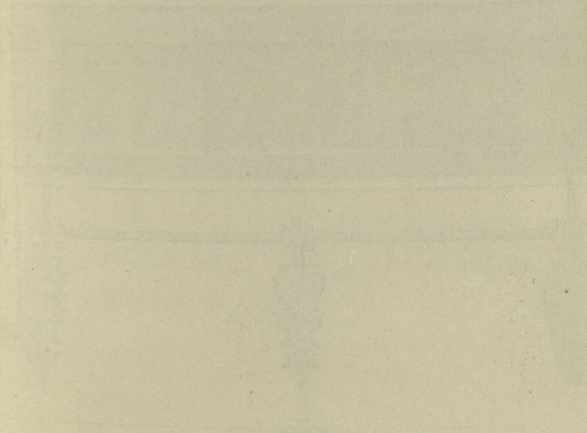


FIG. 2. Elevation of the Window



HURWOOD'S PATENT APPARATUS

FOR MOVING AND FASTENING WINDOWS, &c.

AS APPLIED TO DECKLIGHTS AND SKYLIGHTS.

PLATE V. B.

Fig. 1. Cross Section of a Decklight.

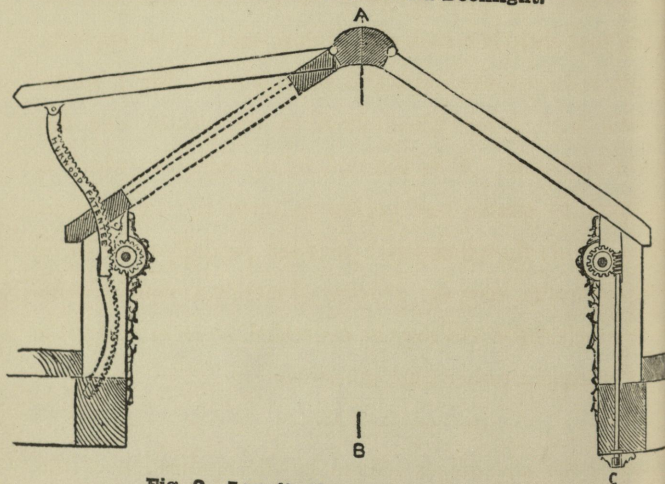
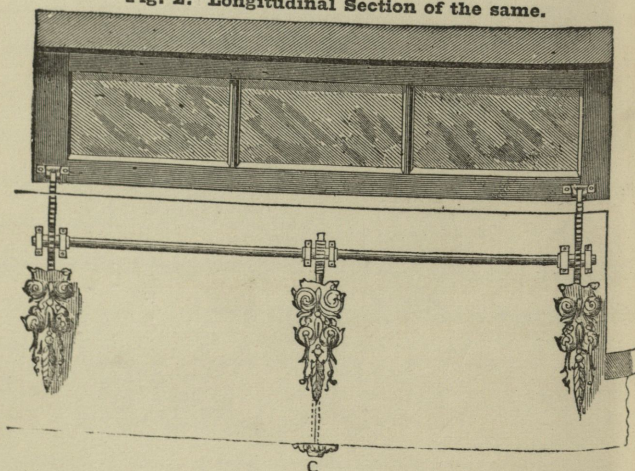


Fig. 2. Longitudinal Section of the same.



DESCRIPTION OF PLATE V.

Lights of this description are raised and supported by toothed racks, working into small pinions, which are moved by the operation of a screw and screw wheel.

By reference to Fig. 1, it will be seen, on the side with the light open that there is a rack and pinion, and on the opposite side, which is closed, the screw and screw wheel. Fig. 2 shews the spindle with screw wheel fixed in the centre, and the pinions at each end. C is the end of the screw to which a key is fitted to enable any person to open the lights from within the cabin; the ornamental parts are partially removed to shew the apparatus, they are introduced merely to represent the mode by which the works may be concealed, so as to make it a matter of ornament rather than otherwise.

Amongst the advantages offered by the application of the invention for this purpose may be named the following :—

- 1st. Windows of any dimension are steadily and without twisting easily opened and closed.
- 2nd. In all positions the windows are secure and free from danger from wind or water.
- 3rd. When closed they are perfectly safe and firmly secured to the frames, so that no rattling or noise of the lights can be produced by the wind.

the description was raised and supported by
the working into small pinions, which are moved by
the end of a screw and screw wheel.
reference to Fig. 1 it will be seen on the side with the
that there is a nut and pinion, and on the opposite
side is placed the screw and screw wheel. Fig. 2 shows
the side with screw wheel fixed in the center and the
nut and pinion. C is the end of the screw to which a
rod is attached to enable any person to open the light train
the door; the ornamental parts are partially removed to
show the mechanism that are introduced merely to improve the
appearance the works may be concealed so as to make it a
plain ornament rather than otherwise.

When the advantages offered by the application of the
this purpose may be named the following:—
of new machines are steady, and without
being easily opened and closed.
all openings the windows are secure and the train
from wind or water.
When closed they are perfectly safe and firmly secured
to the frame so that no rattling or noise of the light
is produced by the wind.

the base of the frame and around the side of the frame

HERWOODS PATENT APPARATUS

FOR MOVING AND PATTERNING WINDOWS

AS APPLIED TO SLIDING WINDOWS

PLATE VI. A-C.

FIGURE 1. Plan and Section of Sliding Window

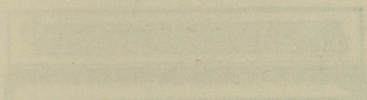
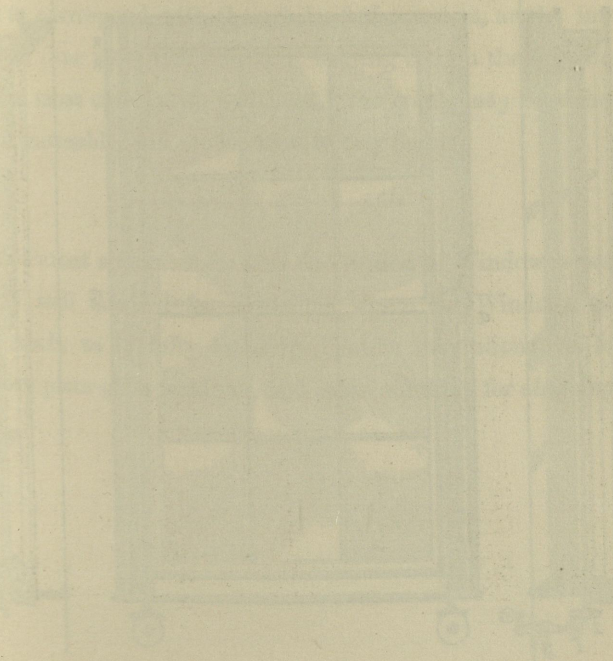


FIGURE 2. Elevation of Window in Closed Position



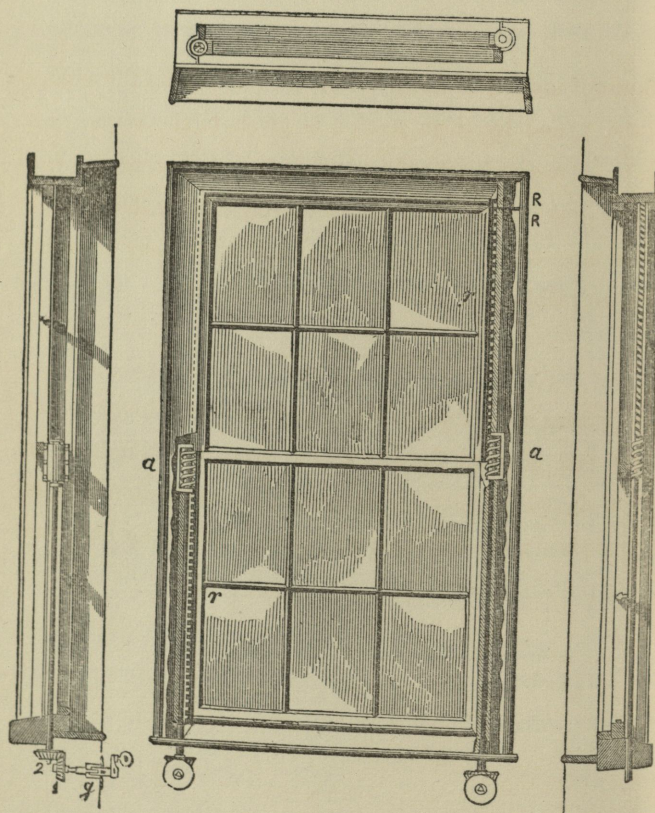
HURWOOD'S PATENT APPARATUS

FOR MOVING AND FASTENING WINDOWS, &c.

AS APPLIED TO SLIDING WINDOWS.

PLATE VI. A A.

Elevation, Plan, and Sections of Sliding Windows,



DESCRIPTION OF PLATE VI.

A pair of toothed bevelled wheels are fixed under the window sill 1 and 2, and by them motion is given to the screws, *a a*. Racks to correspond with the pitch of the screws, are let into each sash (one rack with a friction bearing roll on the opposite side is in most cases quite sufficient,) the crank may be either fixed or moveable, and ornamented to any degree.

The Patent apparatus for this description of Window is particularly well adapted for situations where the Windows are above reach, as in lofty buildings, public institutions, or for expensive plate-glass windows, and cabin windows for shipping.

BUEWOODS PATENT APPARATUS

FOR MOVING AND POSITIONING THE WINDOW

AS SHOWN IN FIGURE 1

FIG. 1

DESCRIPTION OF PLATE VI

A part of the window is shown in the window
and by this motion is given to the window a
motion corresponding with the pitch of the window, and into
the window with a motion being roll on the window
and is most easily effected, the window may be tilted
and is movable, and arranged to any degree.

The Patent apparatus for the description of window is
well adapted for situations where the window is
used as a lobby building, public institutions or for
the plate glass windows and other windows for shipping.

HURWOOD'S PATENT APPARATUS

FOR MOVING AND FASTENING WINDOWS, &c.

AS APPLIED TO CONSERVATORIES, GREEN-HOUSES, ETC.

PLATE VII. A.

Perspective View of House, showing a pair of the Roof Sliding Lights, and also a pair of the Front Lights partially opened.

Fig. 1.

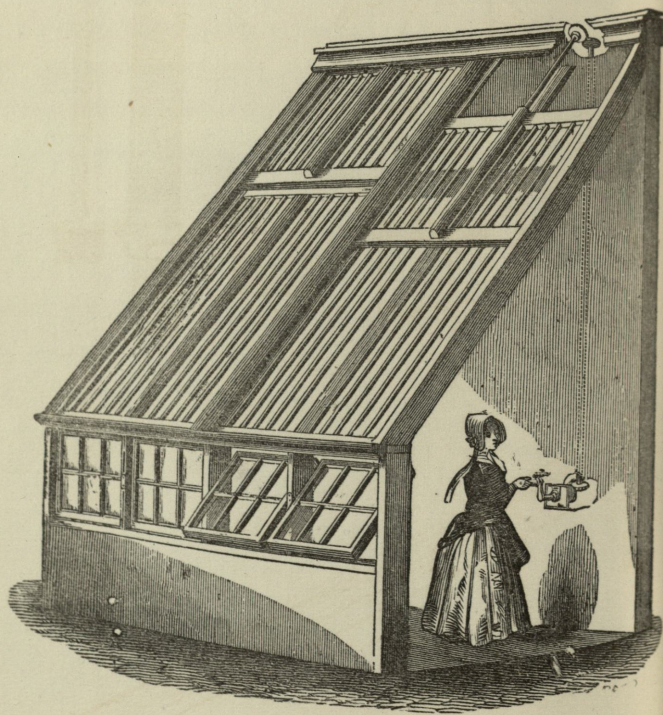
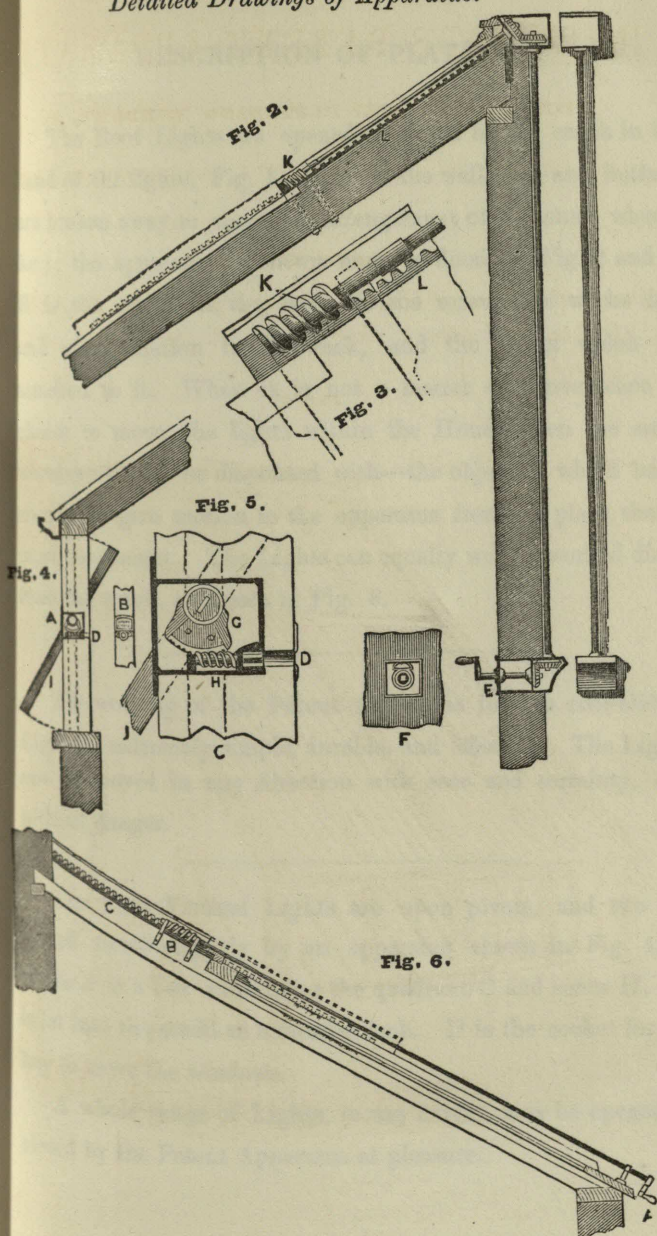


PLATE VII. A.

Detailed Drawings of Apparatus.



the base of the tower and around the base of the tower

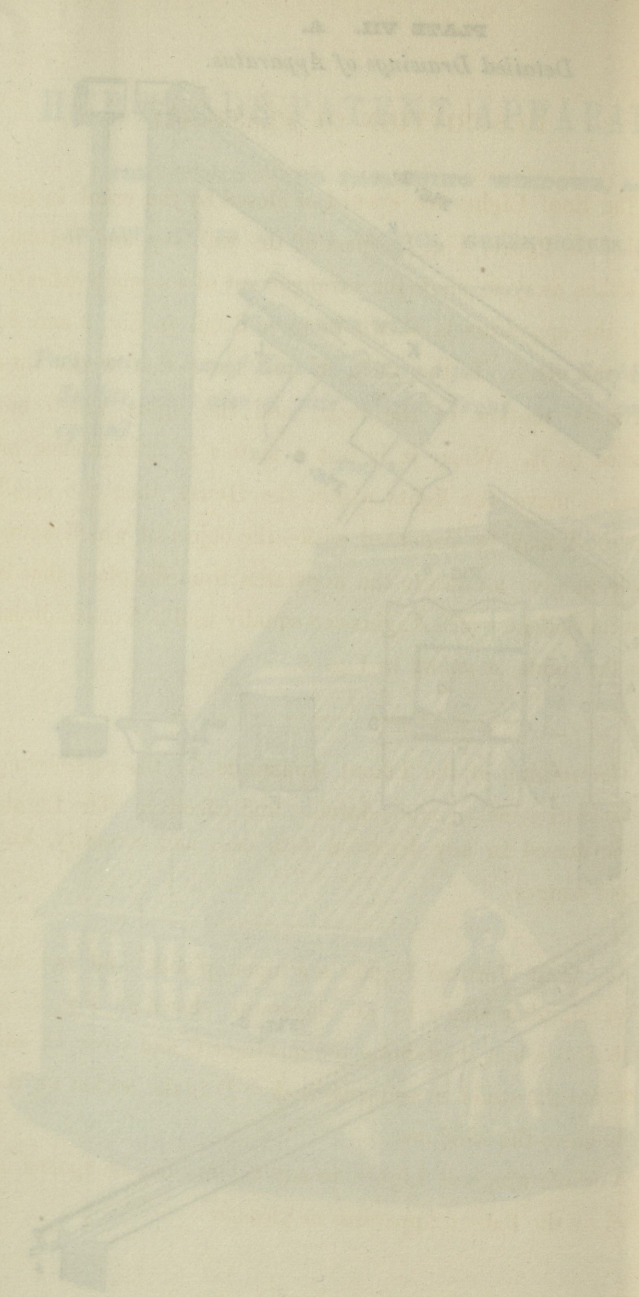


PLATE VII. A.
Detailed Drawing of a Machine.

DESCRIPTION OF PLATE VII.

The Roof Lights are opened or closed by the crank in the hand of the figure, Fig. 1, (part of the wall, top and bottom, are broken away to show the arrangement of the small wheels, &c.); the apparatus is shewn more in detail in Fig. 2 and 3. E is the crank, L the rack, K the screw that works into and gives motion to the rack, and the lights which are attached to it. When it is not a matter of convenience or choice to move the lights within the House, then the small wheel-work may be dispensed with—the object of which being simply to give motion to the apparatus from the place that is most convenient. The Lights can equally well be worked direct from the crank, as shewn in Fig. 6.

The working of the Patent Apparatus for the roof-sliding Lights is extremely simple, durable, and effective. The Lights can be moved in any direction with ease and certainty, and without danger.

The front Vertical Lights are upon pivots, and two are moved simultaneously by an apparatus shewn in Fig. 4, 5, where A is a box containing the quadrant C and screw H, and is let into the studd as a mortise lock. D is the socket for the key to move the windows.

A whole range of Lights, to any extent, may be opened or closed by the Patent Apparatus at pleasure.

DESCRIPTION OF PLATE VII

The Hood Lights are opened or closed by the crank in the end of the figure. Fig. 1. (Part of the well, top and bottom, is taken away to show the arrangement of the small wheels.) (a) the apparatus is shown more in detail in Figs. 2 and 3. It is the crank, L, the rack, K, the screw that works into and gives motion to, the rack, and the lights which are attached to it. When it is not a matter of convenience or desire to move the lights within the House, then the small wheel work may be dispensed with—the object of which being simply to give motion to the apparatus from the place that is most convenient. The Lights can equally well be worked direct from the crank, as shown in Fig. 3.

The working of the Patent Apparatus for the roof-riding lights is extremely simple, durable, and effective. The Lights can be moved in any direction with ease and certainty, and without danger.

The four Vertical Lights are upon pivots, and two are moved simultaneously by an apparatus shown in Fig. 4. 5. Where 4 is a box containing the quadrant C and screw H, and 5 is the socket for the screw into the stand as a motive lock. D is the socket for the screw to move the windows. A whole range of Lights to any extent may be opened or closed by the Patent Apparatus at pleasure.

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HURWOOD'S PATENT APPARATUS,

FOR MOVING AND FASTENING WINDOWS, &c.

AS APPLIED TO FRENCH CASEMENTS, FOLDING WINDOWS, SHADES AND SHUTTERS.

FIG. 1.

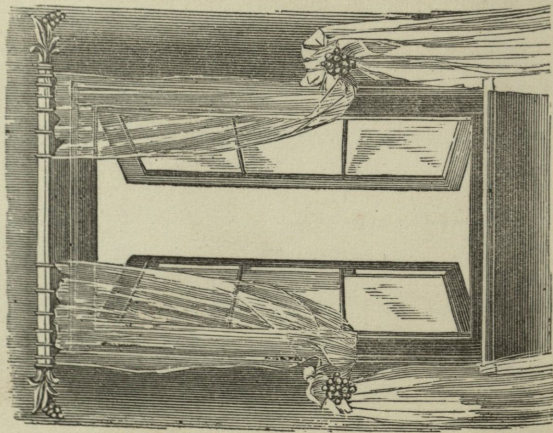


PLATE VIII. F.

FIG. 2.

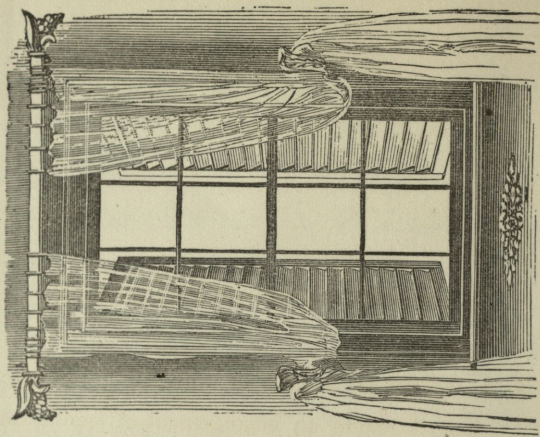
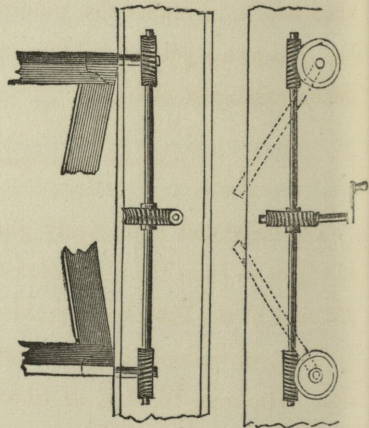


FIG. 3.



DESCRIPTION OF PLATE VIII.

Fig. 1 represents a pair of Folding Windows, partially opened. Fig. 3 shows an arrangement of screws and wheels which are fixed under the window sill, by which it is effected. Fig. 2 shows a pair of Folding Shutters, or Shades, moved by similar arrangements.

For large and extensively glazed Windows, where it is not an object to open them as doors are commonly opened, the application of the Patent Apparatus will be found of value.

The convenience and comfort of being enabled to open or close Windows, Shades, or Shutters, from within, and to set them at any angle at pleasure, and at all points to be quite secure, must be apparent, and for such purposes the application of the Patent Apparatus is very effective.

the lower of the two windows and a small window at the top of the door.

DESCRIPTION OF PLATE VIII.

The first figure is a plan of the building, showing the arrangement of the windows and the position of the door. The second figure is a section of the building, showing the internal structure and the position of the door. The third figure is a plan of the building, showing the arrangement of the windows and the position of the door. The fourth figure is a section of the building, showing the internal structure and the position of the door.

The fifth figure is a plan of the building, showing the arrangement of the windows and the position of the door. The sixth figure is a section of the building, showing the internal structure and the position of the door. The seventh figure is a plan of the building, showing the arrangement of the windows and the position of the door. The eighth figure is a section of the building, showing the internal structure and the position of the door.

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HURWOOD'S PATENT APPARATUS

FOR

MOVING AND FASTENING WINDOWS, VENTILATORS, &c.

A few Testimonials from those who have experienced the utility of the invention.

"An important object has been attained, and one of much value, by the construction of an ingenious screw, for opening and closing the new windows. There is no possibility by fair means of deranging it, or of fastening any thing upon it, and the Patentee, Mr. Hurwood, of Ipswich, has supplied by its introduction, a want long felt in Lunatic Asylums."

Extract from the Annual Report of the Medical Superintendent of the Suffolk County Lunatic Asylum, JOHN KIRKMAN, M.D. December, 1844.

Sir,

I beg to acknowledge the receipt of your Windows, and to express my own entire satisfaction with the ingenuity and efficiency of its contrivance, which I cannot help looking upon as the very best arrangement for the purpose I have ever seen.

*Extract of a letter from RICHARD OLIVER, M.D.
Shropshire County Lunatic Asylum, September 8th, 1845.*

To Mr. Hurwood.

15th February, 1846.

Sir,

In reply to your question respecting your Patent Apparatus for Moving and Fastening Windows, &c. I have great pleasure in expressing my entire approbation of the principle upon which they are constructed. I think it provides in a most satisfactory manner both for the security of the apartment and the requisite amount of ventilation.

Believe me, Dear Sir,
very faithfully yours,

RICHARD OLIVER, M.D.

Medical Superintendent of the Shropshire County Lunatic Asylum.

To Mr. Hurwood.

March 30, 1850.

My dear Sir,

In answer to your enquiries as to my opinion upon the utility of your Patented Invention for Windows for Lunatic Asylums, I beg to say that I have always thought highly of the principle when carried out, by opening the window sashes in several small subdivisions, and when the machinery for opening and closing them is controlled by a small key applied sufficiently low for convenience. Honestly I think your invention a most useful one for the purpose.

I remain, Dear Sir,

Yours truly,

J. HOLLAND, M.D.

*Medical Superintendent of the Lancashire County Lunatic Asylum, Prestwick,
near Manchester, and late Medical Superintendent of the Surrey
County Lunatic Asylum.*

To Mr. Hurwood.

5th April, 1850.

Dear Sir,

I have great pleasure in bearing my testimony to the value of your invention, as applied to the windows in my School-rooms. During the whole period (4½ years) of my experience of them, they have not once required repair, and so far from having caused any trouble, are for all purposes most convenient. The ventilation is, in my opinion, better than in the ordinary windows, as the air does not enter at one point only.

We have suffered no inconvenience from driving rains—although, it is true, has sometimes found its way through one window, but owing, I think, to its not closing so well as the first.

Believe me,

Yours respectfully,

H. T. LUMSDEN,

Incumbent of St. Peter's, Ipswich.

To Mr. Hurwood.

Ipswich, 5th April, 1850.

Sir,

I have great pleasure in being able to give my unqualified testimony respecting the value of your patent apparatus for windows.

Our schools are very large—are furnished with ten windows, of the kind represented in Plate 3 (your book); and though the School-rooms usually contain 200 children each, for the space of six hours daily, we find the ventilation quite sufficient.

As regards strength, elegance of appearance, capability of keeping out rain, and the facility with which the temperature can be altered, without objectionable currents of air, the apparatus is worthy of all praise, and needs only to be extensively known to be generally adopted and thoroughly appreciated.

I am, Sir,

Yours respectfully,

JON. HIRST,

Head Master of the British School.

To Mr. Hurwood.

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Ipswich, April, 1850.

Sir,

I feel great pleasure in bearing testimony to the efficiency of your "Patent Apparatus," the style of which is shewn in Plate 3 (your book), as applied to these Schools.

For combining durability, ventilation, and elegance, I have seen nothing to equal it. As regards durability, there is no perceptible difference either in appearance or working of our windows, although the apparatus have been in work upwards of two years. We find, also, with an average attendance of between 140 and 150 boys, under ordinary circumstances, the ventilation is quite sufficient, although our room is only 50 feet by 24 feet, and would not average 18 feet in height.

The perfect ease and beauty of its motion have called forth the admiration of visitors to our Schools.

I am, Sir,

Yours, &c.

JOHN EVANS,

Head Master of the District School.

To Mr. Hurwood.

Bronzes for Buildings.

BRONZES POUR BATIMENTS.

Bronze für Gebäude.



AUGUSTE

LACARRIÈRE, BREVETÉ

Sans garantie du Gouvernement.

9. — RUE SAINTE-ÉLISABETH, — 9.

PARIS

SUPPLIER FOR ENGINE GAZ-LIGHT to the principal theatres in Paris, Mabilie garden, etc.; Versailles, St-Germain, Orléans, Northern, etc.; rail-ways stations, BRONZES FOR BUILDINGS SHOW-GLASSES AND SHOPS of the Véro-Dodot and Orleans galleries, etc.

Patent for roof-windows (said *Chassis à Tabatière*).

FOURNISSEUR DES APPAREILS A GAZ des principaux théâtres de Paris, du jardin Mabilie et autres, des gares des chemins de fer de Versailles, Saint-Germain, Nord, etc. BRONZES POUR BATIMENTS et ARTICLES D'ÉTAGES des magasins des Galeries vitrées d'Orléans et Véro-Dodot.

Breveté pour Chassis à Tabatière.

REPORT OF THE CENTRAL JURY

(French Exhibition of 1849).

Mr. LACARRIÈRE who already in 1844 had been judged deserving a silver medal, as well for the rapid progress in his industry, as for the considerable extension of his commerce, comes this year always with the excellent conditions the Jury should expect from this first rate manufacturer.

Among the numerous objects worthy of being remarked, is his lustre with crystal well executed and which, in spite of its necessary large conducting pipes for the gas, may be compared for its lightness and good taste to the wax candle lusters.

A Candelabre of a great dimension and severe style has been the subject of a particular attention and serious examination from the Jury. They find in this important piece of work good and well coordinated proportions.

Grandoles with moveable suspensions in spite of the exigences of the gas, are ingeniously arranged.

Those articles so numerous and varied are all executed in the Manufactory of Mr. LACARRIÈRE and under his skillful and laborious direction.

During the five years from one exhibition to an other, indefatigable, he has executed several important works, with success, for Spain, Germany, Holland, United-States (fine lustre for gaz of Barcelonne).

To that trade entirely of art, Mr. LACARRIÈRE joins a considerable establishment for stretched brass mouldings, various stallages for shops, show-glasses, iron-doors which already in 1844, procured him also a silver medal.

This house unquestionably is the first establishment of that kind and it is a simple workman who became by his labour and perseverance to give it and maintain that extension.

The Jury to acknowledge suitably so many qualities and merits, decree to Mr. LACARRIÈRE a golden medal (the only one which they have given for that important branch of trade).

RAPPORT DU JURY CENTRAL

(Exposition Française de 1849).

M. LACARRIÈRE, qui déjà en 1844 avait été jugé digne de la médaille d'argent, tant pour ses progrès rapides dans son industrie, que pour l'extension considérable de son commerce, se présente cette année, toujours avec les excellentes conditions que le Jury avait le droit de retrouver chez cet industriel de premier ordre.

Parmi les nombreux objets dignes de remarque, se distingue un Lustre à cristaux d'une bonne exécution, et qui, malgré la dimension obligatoire pour les conduits du gaz, peut lutter de légèreté et de bon goût avec les Lustres à bougies.

Un Candelabre, d'une grande dimension et d'un style sévère, a été l'objet tout particulier de l'attention du Jury et d'un examen sérieux. On retrouve dans ce morceau important des formes heureuses secondées par des proportions bien coordonnées.

Des bras à suspension mobile, malgré les exigences du gaz, sont d'un arrangement ingénieux.

Ces articles si nombreux et si variés, sont tous exécutés dans les ateliers de M. LACARRIÈRE, et sous la direction et impulsion de ce chef habile et laborieux.

Dans les cinq ans d'une exposition à l'autre, infatigable, il a exécuté des travaux importants, et avec succès, pour l'Espagne, l'Allemagne, la Hollande et les États-Unis (*Beau Lustre à gaz de Barcelonne*).

A cette partie, toute d'art, M. LACARRIÈRE joint un établissement considérable de moulures en cuivre ébrié, des étalages divers pour magasins, des supports, des montres en cuivre, portes en fer, et qui déjà en 1844, lui valurent aussi une médaille d'argent; cette fabrique est incontestablement le premier établissement de ce genre, et c'est un simple ouvrier qui est parvenu à force de travail et de persévérance, à lui donner ce développement et à le lui maintenir.

Le Jury, pour reconnaître dignement tant de qualités et de mérite, décerne à M. LACARRIÈRE une médaille d'or (la seule qui ait été délivrée pour cette importante industrie).



Journit la Einrichtung für die vornehmsten Theater in Paris, den Lust-Garten Mabilie und andere, die Lusthöfe von Versailles, St. Germain, Nordbahn u. Bronze für Gebäude und Laden-Einrichtungen, die beste Glas-Galerien, Erker, der Deléans und Véro-Dodot-Galerie.

Patentirt für Dachfenster-Nahmen.

Rapport des Ausschusses der Geschworenen.

(Ausstellung in Frankreich 1849).

Herr Lacarrière, welcher schon 1844 der silbernen Medaille würdig gehalten wurde, sowohl wegen der schnellen Fortschritte seiner Industrie, als der ungeheuren Ausdehnung seines Geschäftes im gegenwärtigen Jahre, und immer in den besten Conditionen, welche die Jury bei diesem industriellen Fabrikanten ersten Ranges das Recht zu hoffen hatte.

Unter den vielen aller Artung veredelmollen Sachen zeichnet sich besonders ein Kronleuchter mit Kristall-Glas vorzüglich aus, welcher ungeachtet seiner erhebten Größe der Gas-Röhren halber, nicht desto weniger mit der Leichtigkeit und dem guten Geschmacke eines Wandstengens-Leuchters den Rang halten kann.

Ein Arm-Leuchter ungewöhnlicher Größe erregte besonders die Aufmerksamkeit und die erste Untersuchung der Geschworenen; man findet in diesem Stücke gute gewählte Form durch Proportion richtig vereint.

Wand-Leuchter an beweglichen Gekänge, für Gas-Beleuchtung, sind ingenieus eingerichtet.

Alle diese gahreichen und verschiedenen Gegenstände sind in den Werkstätten und unter der Leitung des geschäftigen und arbeitsamen Herr Lacarrière verfertigt.

In den fünf Jahren Zwischenzeit, einer Ausstellung zur andern, hat er unermüdet und mit Erfolg für Spanien, Deutschland, Holland und den vereinigten Staaten Amerikas, große Arbeiten ausgeführt. (Schöner Gas-Kronleuchter für Barcelona.)

Herr Lacarrière beschäftigt außer der Kunstarbeit eine ausgebreitete Werkstätte mit gegengem Messing, für Erker und Laden, Tragarne und eiserne Läden, welche schon 1844 ihm die silberne Medaille erwarren haben. Diese Fabrik ist unstreitig die erste dieser Art und hat ihre Ausdehnung und Wirksamkeit nur der Ausbauer und dem Fleiße eines gewöhnlichen Arbeiters zum Grunde.

Die Jury, um so vielen Verdienst und viele Eigenschaften würdig zu belohnen, bestimmt Herrn Lacarrière die goldene Medaille, (die Einzige, welche dieses Fach erhalten hat).

AUGUSTE
LACAPRIÈRE.

AUGUSTE

CHEAP, DURABLE, & EFFECTIVE ROOFING.

F. McNEILL & Co.,
(PATENT FELT WORKS, BUNHILL ROW, LONDON),

MANUFACTURERS AND ONLY PATENTEES
OF THE

ASPHALTED ROOFING FELT

WATERPROOF BITUMINOUS FELT,

FOR LINING DAMP WALLS (FREE FROM UNPLEASANT SMELL).

THICK & THIN SHIPS' SHEATHING FELT,

For Placing under Wood Doubling or Copper Sheathing;

ALSO MANUFACTURERS OF

THICK HAIR FELT,

FOR DEADENING SOUND IN THIN PARTITIONS AND
UNDER FLOORS, &c.

AND

VERY THICK HAIR FELT,

FOR COVERING PIPES, BOILERS, &c., OF STEAM ENGINES,

By which a Saving of 20 per Cent. is effected in Fuel.

At the Great National Agricultural Shows, it is this Felt which has been exhibited, and for its merits TWO SILVER MEDAL PRIZES have been awarded, and is the Felt solely patronised and adopted by

HER MAJESTY'S WOODS AND FORESTS,

HONOURABLE BOARD OF ORDINANCE,

HONOURABLE EAST INDIA COMPANY,

HONOURABLE COMMISSIONERS OF CUSTOMS,

HER MAJESTY'S ESTATE, ISLE OF WIGHT,

ROYAL BOTANICAL GARDENS, REGENTS PARK;

THE GREAT WESTERN, NORTH-WESTERN, SOUTH-WESTERN,

and all the Railways.

And on the Estates of the Dukes of Sutherland, Norfolk, Rutland, Newcastle, Northumberland, Buccleuch (at Richmond), the late Earl Spencer, and most of the Nobility and Gentry, and at the Royal Agricultural Society's House, Hanover Square.

ESTABLISHED THIRTEEN YEARS.

Roofing Felt, One Penny per Square Foot.

F. McNEILL'S PATENT FELT WORKS, BUNHILL ROW.

The Original and only Works of the kind in London

ANCEY,

FIELD AGENT,

LONDON.

*unders and Manufacturers of Lamps
as Lamps and fittings. etc.*

Patent and other Cocks, Bells. etc.

*for Locks, Nails, Screws, and all
Ironmongery, etc*

*ers, etc. and General Dealers in
ware.*

Engineer, Millwright, & Machinist.

**HUTTERS WITH
LATHS.**

DIAL VASE.

**Ship Lamps—Lanterns, Can-
lades for Candles; also Gas
erally.**

ag, Syphon; Hogshead, But-

, Water Closets, Lift Pumps

Hot Oil Lamps.

ades.

**INGS of every Description.
VARIETY.**

ANIMAL CARCASSES

LATHES, Stamps, Fly Presses, and Machinery.

**LETTER-PRESS, COPPER-PLATE, & LITHOGRAPHIC PRINTING
PRESSES.**

LOCKS, HINGES, BOLTS, &c. of every description.

Nails, Screws, and Rivets, in great Variety.

Plantation Tools generally.

ASPHALTED ROOFING FELT

(for price and size of Rolls, etc., see page 3).

Directions for Covering Verandahs.....

- „ To make a cheap and desirable Ceiling under Slates
- „ Lining Damp Walls
- „ Weather Boarded Roofs out of repair
- „ Scantling of Timber required
- „ Laying on the Felt
- „ Unrolling the Felt
- „ Preparing the Mixture, and Coating the Felt with it.....
- „ For laying of Flat Roofs
- „ Painting the Felt.....
- „ Covering Ricks and Stacks
- „ Guttering

Illustrations of Roofing Felt for Light Ceilings

Light Ceiling for a Corrugated Iron Roof

HAIR FELT, for Clothing Boilers, &c.....

Ships' Sheathing Felt.....

Asphalted Railroad Felt

Prices of Tar, Brushes, Kettles, Buckets, Nails, &c.

Very extensive and Important Works where the Felt is used

The use of it for Garden Purposes (Directions)

TESTIMONIALS

For General Roofing Purposes.....

Garden Purposes

Lining Walls

Ceilings

Gutterings

Where Paint has been used

THE PUBLIC ARE RESPECTFULLY CAUTIONED,

That the only Works in London or in Great Britain where the

PATENT FELT FOR ROOFING

IS MADE, ARE

F. McNEILL and Co.'s Manufactories,

IN BUNHILL ROW,

Where it was first made, and which have been established by the
Proprietors nearly Twelve years;

*And none other is adopted or used by Her Majesty's
and Forests.*



width, 32 inches wide, the number of lengths of that width necessary to cover round the room. Even where canvass and battening is used, it will be found desirable to place the Asphalted Felt behind it. The least of it is of such little moment for such a purpose as the thoroughness of a damp wall. It can be nailed up with well tinned clout nails and a little soft sticky pitch, which, behind the Felt, will not smell.

LABOURERS' COTTAGES.—The Felt will be found most admirable for Roofing, as the Roof can be constructed to save the expense of Purlins, by having Purlins, four feet apart, and placing boarding running from ridge to eaves. This plan will give all the advantages of a Ceiling without the expense. The Cottage will be more airy and healthy from having all the open space of the rise of the Roof, and will also be very warm in winter.

WEATHER BOARDED ROOFS out of repair, or that have become leaky with cracks, and the wood otherwise unsound—To cover them with McNeill and Co.'s Asphalted Felt will be found advantageous and durable, as it generally happens that their structure will only admit of new roofing being used; by this means for a trifling expense they are made effective and sound for many years longer, when it could only have been in the contemplation of the proprietors to pull them down altogether.

FOR SHIPPING TO THE COLONIES, it is particularly suited.

As the Felt, from its non-conducting qualities, resists the external heat of the sun, and does not crack with changes of temperature, and is the strongest as well as the most portable article yet Manufactured, and being easily applied, any unpractised hand may readily roof his own house.

It is Manufactured of one width only, which is 32 inches wide, but to any given lengths of that width up to 30 or 35 yards.

Parties sending to the manufactory, LAMB'S BUILDINGS, BUNHILL ROW, LONDON, may have it immediately cut off from the machines, and finished on the instant, so that they pay for no more than is actually used.

The price of Roofing Felt is only ONE PENNY per SQUARE FOOT, or Eightpence per running yard of 32 inches wide, delivered in London.

SAMPLES SENT FREE TO ANY PART OF THE TOWN OR COUNTRY, ORDERS BY POST IMMEDIATELY EXECUTED.

FOR THE CONVENIENCE OF PARTIES LIVING NEAR LONDON, Messrs. McNEILL and Co. keep workmen to send out to put on the Felt: this is not necessary, as it is easily put on by a country carpenter or labourer.

See Reference to important Works at the end of the Book.

McNEILL, FIELD AGENT, LONDON.

Sunders and Manufacturers of Lamps
as Lamps and fittings. etc.

Patent and other Cocks, Bells. etc.

for Locks, Nails, Screws, and all
Ironmongery, etc

ers, etc. and General Dealers in
ware.

Engineer, Millwright, & Machinist.

HUTTERS WITH LATHES.

DAL VASE.

Ship Lamps—Lanterns, Candles for Candles; also Gas
generally.

ing, Syphon; Hogshead, But-

, Water Closets, Lift Pumps

Hot Oil Lamps.

ades.

INGS of every Description.
VARIETY.

I ANIMAL CARCASSES

LATHES, Stamps, Fly Presses, and Machinery.

LETTER-PRESS, COPPER-PLATE, & LITHOGRAPHIC PRINTING
PRESSES.

LOCKS, HINGES, BOLTS, &c. of every description.

Nails, Screws, and Rivets, in great Variety.

Plantation Tools generally.

PATENT HAIR FELT,

FOR

CLOTHING THE BOILERS, CYLINDERS, PIPES OF STEAM ENGINES.

*Effecting thereby a saving of from 20 to 25 per cent. in
Consumption of Fuel.*

The advantages of clothing the Boilers, Pipes, and Cylinders of Engines with Dry Hair Felt, is now placed beyond question. The economy of fuel above mentioned has been often proved statistically keeping an account of the quantity consumed and of water evaporated respectively, a week without, and a week with, the clothing of the Boilers, and there is scarcely an establishment of any magnitude, with power, in the British Empire, that has it not in use. All the Government Engines, large and small, whether marine or land, have their Boilers clothed with Felt.

Besides the great Saving of Fuel, by preventing the escape of heat, the temperature of the Engine-Room is kept cool; this advantage is particularly manifest on board STEAM-VESSELS, in preventing the injury which the caulking of the seams is exposed by the proximity of the heat, as well as in promoting most essentially the health and comfort of the engineer. The boiler also is in a great measure preserved from corrosion, which generally takes place when the external surface is not covered. The room for the stowage of fuel is considerably economised, and by the partitions near the boilers, which form the cabins, they are rendered much cooler, and far more healthy and comfortable.

In Boilers worked at very high temperatures, such as Locomotive ENGINES, the advantage is still more apparent; the quantity of steam exposed to radiation, and their great speed, rendering a clothing indispensable.

SUGAR BAKERS, BREWERS, DYERS, and all establishments where steam is used for boiling, will find the benefit of clothing their Boilers, whether jacketed or not.

It is also particularly recommended to ARCHITECTS and BUILDERS to use it in **thinning partitions**, and as a lining for top rooms, houses covered with lead, zinc, iron, or slates, placing it behind the lining or wood lining; as from its non-conducting qualities it has the advantage of keeping the room perfectly cool under the most scorching heat, and of securing warmth during the most frosty period of winter.

Manufacturers of IRON HOUSES and CHURCH ROOFS for exportation to tropical countries, should never neglect to avail themselves of this important benefit.

The Dry Hair Felt is made in sheets, 34 by 20
44 & 40 oz. to the sheet.—Used for Clothing the Boilers, Pans, Cylinders, and large Steam-pipes, *effecting a saving of 20 per cent. in the consumption of fuel*, being the thickest of this description that is made. Price 13d. & 12d. per sheet.
32 oz. to the sheet.—Principally used for Clothing small Steam-pipes. Price at per sheet.



For Laying on F. McNeill and Co.'s Roofing Felt,
 mixing it with a Mixture of Tar, Old Slaked Lime, and Sand,
 which is absolutely necessary to complete the article for Roofing
 purposes.

SCANTLING OF TIMBER REQUIRED.

The Felt is to be used for covering the Roofs of Dwelling-houses,
 Workshops, and Permanent Buildings of that description, the
 scantling can be as light as 3½ inches by 1½, or 1½ for a Rafter of 9 feet
 increasing or decreasing the scantling as the bearing may be
 longer or shorter. The Rafters should be placed about 18 or 20 inches
 apart, and covered over with half-inch boarding—or, as carpenters term
 it, cut stuff. See fig. 1, page 12.

There is another and perhaps the best and most economical method of
 constructing a Roof to receive the Felt; it is to do without Rafters. In a
 case of extensive span to frame with principals about every 12 feet dis-
 tant, and purlins from four to six feet apart; the scantling of the timbers
 should be deep but slight; then lay with ½ or ¾ boarding, running from eaves
 to ridge; a lean-to Roof for a large or small shed can be constructed on
 this plan. And, for long ranges of shedding, from 10 to 12 feet wide,
 a span Roof, with principals 12 feet distant, of slight scantling will
 be sufficient, and have neither Purlins nor Rafters, but a ¾ boarding run-
 ning from eaves to ridge, nailed to the plate and ridgepiece; these plans,
 when being ready, strong, and of little expense, make a Roof, when
 covered with Felt, as effective, if not more so, against rain, heat, or frost,
 as if it were both slated and ceiled. See figs. 2 and 3, page 13.

In a close boarded roof, an incline of from 2 to 3 inches to the foot
 will be quite sufficient.

The Carpenter should take care to take off the aris edge of the boarding
 at the edge of the eaves that it may not cut through the Felt.

For covering Temporary Erections the Felt has been used and found
 to answer without boarding, on Rafters not exceeding 3 inches by 1½, for a
 span of 9 feet bearing (increasing or decreasing the scantling according
 to the length, as before stated), and should be placed at a distance of 30
 inches apart, from centre to centre; in which case to prevent the Felt
 from sagging, it is necessary to have two or three battens or slight Raf-
 ters about 2 inches by 1 intermediately between the stronger rafters.
 The use of iron hooping has also been suggested for this purpose. See
 pages 14 and 15, for another plan, which is perhaps preferable.

This description of Roof requires to have a pitch or elevation of about
 1 inch to the foot.

UNROLLING THE FELT.

In unrolling the Felt, the man should, as he proceeds in unfolding
 the piece, relieve the edges gently and patiently; and if found
 dry and adhesive, they should be separated with a knife rubbed over
 with grease. If, from the coldness of the weather, or from its being long
 in the roll, the Felt should be found stiff and sticky, it should be placed
 for a short time before (but not too near) the fire, and then unrolled, and,
 if convenient, cut to the required lengths, and whilst in a warm state
 laid on the floor or a flat surface; this will cause the Felt to become
 soft and even, and can be easier applied to the roofs.

**ANCEY,
 FIELD AGENT,
 LONDON.**

Suppliers and Manufacturers of Lamps
 as Lamps and fittings. etc.
 Patent and other Cocks, Belts, etc.
 for Locks, Nails, Screws, and all
 Ironmongery, etc
 etc. etc. and General Dealers in
 Ware.

Engineer, Millwright, & Machinist.

**HUTTERS WITH
 LATHS.**

WATER VASE.

Ship Lamps—Lanterns, Can-
 dles for Candles; also Gas
 Lamps generally.

Syphon; Hogshead, But-

Water Closets, Lift Pumps

Hot Oil Lamps.

ades.

**INGS of every Description.
 VARIETY.**

ANIMAL CARCASSES

**LATHES, Stamps, Fly Presses, and Machinery.
 LETTER-PRESS, COPPER-PLATE, & LITHOGRAPHIC PRINTING
 PRESSES.**

LOCKS, HINGES, BOLTS, &c. of every description.

Nails, Screws, and Rivets, in great Variety.

Plantation Tools generally.

LAYING ON THE FELT.

DWELLING HOUSES AND PERMANENT BUILDINGS CLOSE BOARDING. On such a roof, the Felt can be laid longitudinally from gable to gable across the roof from eaves to eaves, as shown in fig. 7, over-lapping *one inch*, or an inch and a half, at the joinings, and closely nailing the over-lap, at from about two to three inches between each nail.

But as a rule (except to quite flat roofs), it is best to lay the Felt the same way as the boarding—that is, to have the joints of the boards parallel to the joints of the Felt, which allows a free expansion and contraction of the boards, without disturbing the surface of the Felt.

To what is termed quite flat roofs, and only a single thickness of Felt is used, the joints of the Felt must be placed at right angles to the fall, to enable the water freely to run off; but the Manufacturer recommends two thicknesses to be used to **QUITE FLAT ROOFS**, and large the joints is then not needed. See Directions for LAYING OF Felt on page 10.

AT THE EAVES the Felt should be brought over the edge of the roof about three or four inches underneath, and to be fastened underneath means of a slip of wood about one inch wide by full half-inch thick, a hollow struck on the bottom side to carry off the drip. See letter S, page 18. Also just at the eaves and outer edges the Felt should be coated with a little Tar (some of the coating mixture is best), to enable the Felt to adhere to the boards, and in other words, the Felt should be well coated on both sides just at the edge of the roof, and the slip of wood should have a little Tar on it where it fastens the Felt before nailing on. *These precautions will totally prevent the Felt from being injured at the eaves.* Some persons, as an extra precaution, use a double thickness of Felt just at the edge of the eaves, cementing the two thicknesses together by means of the coating mixture of Tar, &c. The painter should take care to take off the aris edge of the Boarding at the eaves.

THE GUTTERS should be made of *two* thicknesses, one on each side, other, joined or cemented together with the boiling mixture. Care is taken to fit close round the chimneys, and to point over all with Cement, or stiff mortar. See page 34, Instructions for Gutters.

When the Felt is laid on across the roof, from eaves to eaves, deal battens, of an inch in thickness, and an inch and a half wide, are rounded at the top and extending from the ridge to the eaves, are nailed directly over the joinings, which will be an extra security, and give to the Felt an ornamental appearance; less nails will also be necessary at the joints.

SHEDS AND TEMPORARY ERECTIONS WITHOUT CLOSE BOARDING.—When close boarding is not used, the Felt must be laid ON ACROSS THE ROOF FROM EAVES TO EAVES ONLY, over-lapping full an inch and a half, at the joinings, which will be on each rafter 30 inches apart, and nailing through the over-lap into the rafter, about the eaves.

When boarding is not used (previous to fixing the Felt on the roof), the best plan is, to cut it in the necessary lengths, place them on the surface, and coat them with the mixture, &c.; and with this plan the Felt is the better for corrugating it a little in putting it on.

NOTE.—When the felt is thus laid on, it is desirable that the roof should have a pitch or elevation of about six inches to the foot.



THE DESCRIPTION OF NAILS commonly used are 2d. clout, or 4d. scupper, which is a nail with a very broad head; the latter is only preferred when the Felt is placed lengthways. If convenient, it should be heated in a shovel and thrown into grease, which prevents it from rusting afterwards. See page 25, Prices of Nails. *and modes of using them.* A Country Carpenter, or even a handy Labourer, with these directions explained to them, will be found ready and competent workmen to put on and coat the Felt.

PREPARING THE MIXTURE, AND COATING THE FELT WITH IT.

ALL ROOFS COVERED WITH THE FELT must get a GOOD COATING OF the following cheap preparation—

Take COAL TAR, or what is the same thing, GAS TAR, or, if convenient, STOCKHOLM TAR, and dry, fine-pounded CHALK, or WHITING, or LIME, after being well slaked by long exposure to the air, in the proportion of from 3 to 4 gallons of tar to 1 of chalk, or whiting, or lime, well boiled together, kept constantly stirred while boiling, and put on hot, with a common mop, or brush; at the same time, some coarse sharp sand should be added over it. In cold weather a less proportion of chalk will be found necessary. Half Stockholm tar and half Coal tar, by some, is very much preferred.

Stockholm Tar, the common coal tar, such as is generally procured from the gas-works, is thin and watery, it should therefore boil gently for about half an hour (the Stockholm tar, or the purified tar does not require this extra boiling). The chalk, whiting, or slaked lime should then be put in with it, care being taken not to thicken it too much, but to keep it of that free consistency, such as can be easily applied with the brush. Should it be found too thick (which is apt to be the case when allowed to boil too long before using) more tar should be added. Whilst the mixture is boiling, it should be constantly stirred with a stick, and the brush only put in when about to be used. For the

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LOCKS, HINGES, BOLTS, &c. of every description.

Nails, Screws, and Rivets, in great Variety.

Plantation Tools generally.

Her Majesty's Admiralty have recently covered with F. M'NEILL'S ASPHALTED ROOFING FELT one of their large Store Shed in Woolwich Dockyard, and think highly of the Roofing purposes; and, as a further approval of their article for purposes, the Admiralty have more recently used some 30,000 of extensive shed at the Devonport Dockyard.

The immense Government Prisons which have recently been for Convicts at the Isle of Portland, and at Spike Island, to F. M'Neill and Co.'s Asphalted Felt has been used. In the timbers of the Roof are shown; there are no lath and plaster. The Felt is placed between the boarding and the slates. Such a construction effectually excludes the frost of winter and the heat arising from the sun on the slates in summer; and as the roofs are much exposed also keeps them tight and sound in stormy weather.

One hundred thousand feet of F. M'Neill and Co.'s Asphalted Felt the Government have used on these buildings.

Note its Cheapness—One Penny per Square Foot.

Samples and full particulars sent post free, on application to
PATENT FELT WORKS, BUNHILL ROW, LONDON.

Orders attended to by post letter.

THE PUBLIC ARE RESPECTFULLY CAUTIONED

That the only works in London, or in Great Britain, where

Patent Felt for Roofing

IS MADE, ARE

F. M'NEILL & Co.'s Manufactory

**IN BUNHILL ROW,
LONDON,**

Where it was first made, and which have been published by the Present Proprietors nearly Thirteen Years, and none other is adopted or used by Her Majesty's Woods and Forests.



HARCOURT QUINCEY,

BIRMINGHAM AND SHEFFIELD AGENT,

82, HATTON GARDEN, LONDON.

AGENT FOR

T. SMITH AND SONS,	Birmingham,	}	Cabinet Brass Founders and Manufacturers of Lamps
MARTINEAU AND SMITH,	"		Chandeliers, Gas Lamps and fittings. etc.
ROBERT SMITH & CO.	"	}	Manufacturers of Patent and other Cocks, Bells, etc.
GEORGE & THOMAS GRAY,	Sheffield.		General Factors for Locks, Nails, Screws, and all descriptions of Ironmongery, etc.
JAMES HODGSON,	Liverpool	}	Saw Manufacturers, etc. and General Dealers in Sheffield Hardware.
			Iron-Boat Builder, Engineer, Millwright, & Machinist.

PATENTEE OF REVOLVING IRON SHUTTERS WITH
CONVEX, CURVILINEAR, OR BENT LATHS.

PATENTEE OF THE PEDESTAL COAL VASE.

CABINET BRASS FOUNDRY (of the best description.)

BELLS, AND BELL FURNITURE,

LAMPS for burning Fat or Tallow.

LAMPS, Solar, India, or Argyll—Undershade, Carcel, and Ship Lamps—Lanterns, Candelabra, Pillars, Brackets and Chandeliers with Glass Shades for Candles; also Gas Chandeliers, Lanterns and Burners—and Mountings generally.

COCKS, (of the first quality.)—Spirit, Wine, Beer, Bottling, Syphon; Hogshead, But-Racking.

PLUMBERS' BRASS WORK—Bib, Stop, and Ball Cocks, Water Closets, Lift Pumps Force Pumps, Valves, &c.

PARKERS' PATENT Argyll or India Lamps. Economic Hot Oil Lamps.
Steam Fountain Coffee Pots, Folded Paper Lamp Shades.

PERKES'S PATENT Folding Iron Bedsteads,

QUINCEY'S PATENT Folded-Paper Lamp and Candle Shades.

SHIPS' BRASS FOUNDRY, IRONMONGERY, and FITTINGS of every Description.
SHIP AND CABIN LAMPS IN GREAT VARIETY.

APPARATUS FOR EXTRACTING TALLOW FROM ANIMAL CARCASSES

AGRICULTURAL Implements.

ANVILS, Vices, Hammers, &c.

Carpenters', Shipwrights', and Smiths' Tools.

Engineers' Tools, Files, &c.

LATHES, Stamps, Fly Presses, and Machinery.

LETTER-PRESS, COPPER-PLATE, & LITHOGRAPHIC PRINTING PRESSES.

LOCKS, HINGES, BOLTS, &c. of every description.

Nails, Screws, and Rivets, in great Variety.

Plantation Tools generally.

Portable Fire Engines.

Portable Forges and Bellows,

Spades, Shovels, Scythes, Sickles, &c.

SAWS, Hand, Frame, Mill, Circular, &c.

SAW MILLS, and **PLANING MACHINES.**

SCREW and **HYDRAULIC** Cotton, and General Bale Presses.

STEAM ENGINES, to 20 horse-power.

Screw Jacks, Hoisting Blocks, &c.

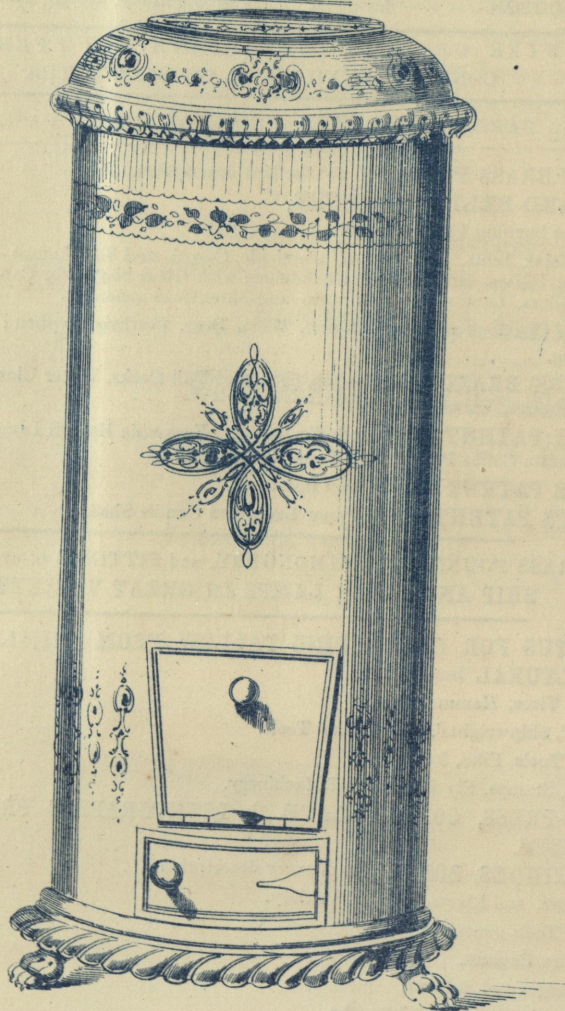
SUGAR MILLS, and Apparatus.

Wharf and Warehouse Cranes.

WROUGHT IRON LIGHTERS & BOATS, BUOYS, TANKS, &c.

THE 1851
PEDESTAL COAL VASE.

EXTERNAL VIEW



THE 1851 PEDESTAL COAL VASE.

SECTION.

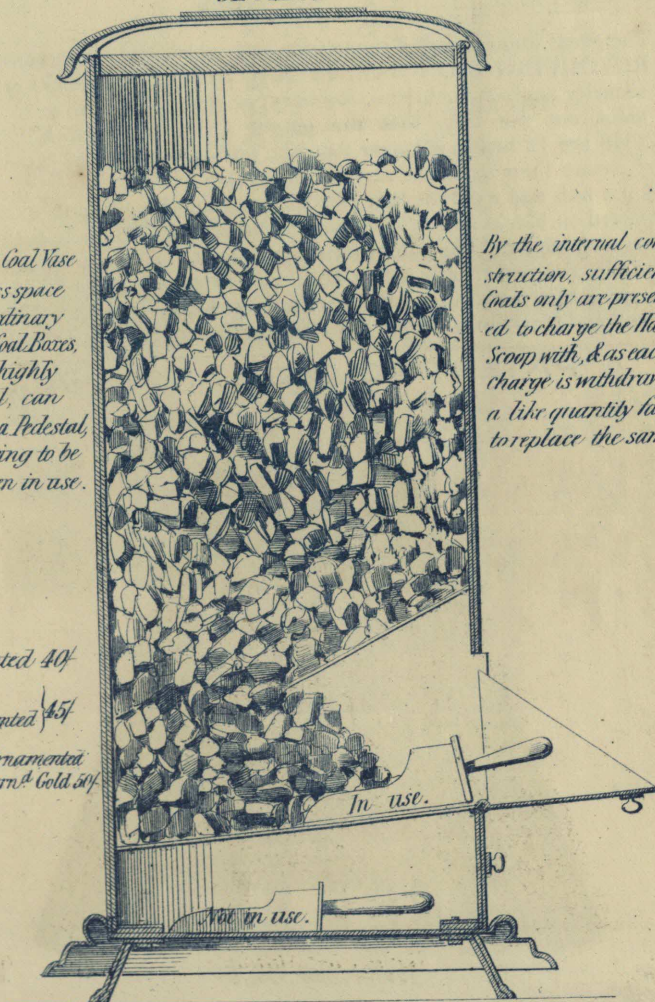
This Patent Coal Vase occupies less space than the ordinary Scuttles or Coal Boxes, and being highly ornamental, can be used as a Pedestal, not requiring to be moved when in use.

Ornamented 40¢

Richly Ornamented 45¢

Richly Ornamented with Burnt Gold 50¢

By the internal construction, sufficient Coals only are presented to charge the Hand Scoop with, & as each charge is withdrawn, a like quantity falls to replace the same.



HARCOURT QUINCEY, PATENTEE.

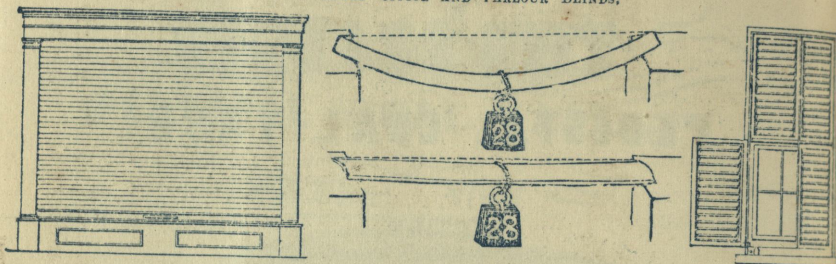
HARCOURT QUINCEY, INVENTOR AND PATENTEE

OF REVOLVING IRON SAFETY SHUTTERS WITH CONVEX, CURVILINEAR, OR BENT LATHS

PANNELLED IRON SAFETY SHUTTERS.

OUTSIDE SHUTTER BLINDS WITH PATENT MOVEMENTS,

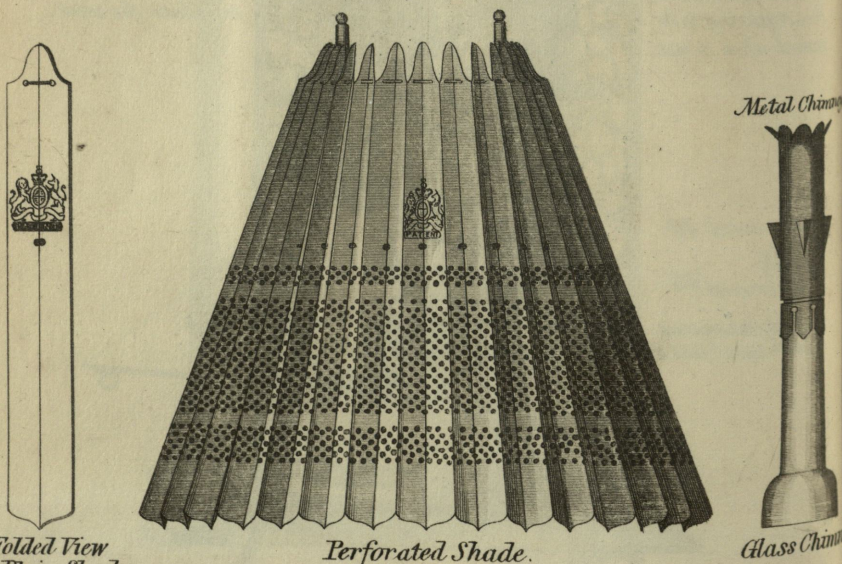
CORRUGATED OFFICE AND PARLOUR BLINDS.



The great importance of INCREASED STRENGTH and STIFFNESS, in the laths of REVOLVING IRON SAFETY SHUTTERS, (especially when required for security against Accidents, Robbery, or Spread of Fire) is so obvious, that to point out the fact, that the patent CONVEX and CURVILINEAR LATHS are 12 inches stronger than the ordinary flat Lath; (as shown above), must ensure their being universally adopted,

A flat lath and a patent lath of corresponding length and substance were supported on blocks and a 28lbs. weight suspended from each, the flat lath gave a dip of $1\frac{1}{2}$ inch and the patent lath $\frac{1}{2}$ inch only. Again, 2 laths were tested a given dip, the patent lath with a 56lb. weight gave exactly $\frac{1}{4}$ inch dip, the flat lath gave the same dip ($\frac{1}{4}$ inch) with only $4\frac{1}{2}$ lbs. weight. Thus the Patent Convex and Curvilinear laths, are 12 inches stronger than ordinary flat laths.

PATENT FOLDED LAMP SHADE.



*Folded View
of a Plain Shade.*

Perforated Shade.

Glass Chimney

The Patent Folded Shade possesses the advantage of a much more extended surface for reflection of Light, and of being folded into a *small compass when not in use*; and may be applied to any lamp, by a suitable wire frame.

It reflects a brilliant and soft light on the table, and, at the same time, being transparent, allows sufficient light to pass upwards to illuminate the upper portion of the room.

The PATENT FOLDED LAMP SHADE is adapted for French Lamps, Solar Lamps, Gas-burners, Spirit Lamps, and Candle Lamps, in every variety.

HARCOURT QUINCEY, 82, HATTON GARDEN LONDON.



REMYNGTON'S PATENT IMPROVED ROASTING APPARATUS,

DEPÔT:

138, SLOANE STREET, nearly opposite Trinity Church,
Where powerful and superior finished Bottle Jacks may also be had.

This Apparatus, which has attracted universal admiration, contains a self-acting Baster, with Double Reflectors. Its advantages are—

**Perfect Cleanliness,
Economy of Fuel,
And a consequent preservation and retention of the
Pure Flavour of the Meat.**

It is simple in its use, rendering it a most desirable article in all domestic Establishments, and being so compact and portable is peculiarly suited for the Army, Navy, Travellers, Sportsmen, Yachters, &c.

DESCRIPTION.

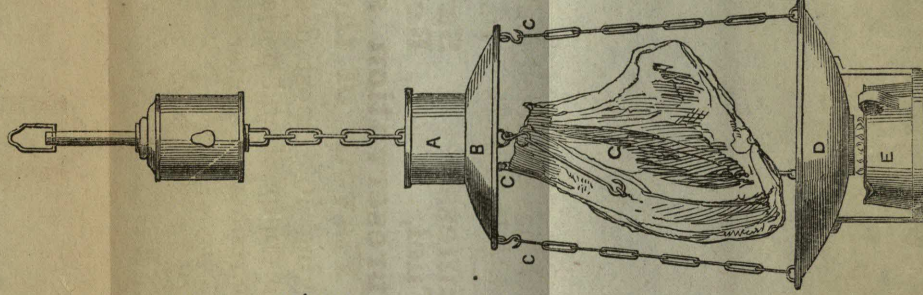
A is a cup in which the material for Basting is placed; in the bottom of this cup is a cone perforated with small holes, through which the fat percolates, and distributes itself over the surface of the Meat.

B is the heat reflector, curved so as to gather the greatest amount of heat, which is then thrown on the Meat.

CCC are chains suspended from the rim of the heat-reflector, and attached to the cylindrical dish D, between which and the heat reflector B, the Meat hangs.

D. The dish D is also a reflector, and the combined action of these two reflectors has the effect of browning the Meat, top and bottom, without the trouble of turning or taking from the fire.

The centre of the dish D is pierced with holes, through which the dripping from the Meat runs clear of all impurities into a cup E, placed upon the stand of the dripping pan.



DIRECTIONS FOR USE.

In Roasting with this apparatus, the Joint or Poultry should be hung close to the heat-reflectors B and D.

If it be necessary to commence Basting immediately the Meat is at the fire, the basting-cup A should be charged with butter or dripping, but if it be the intention to use the fat from the Meat only, the bottom cup E must be removed when it has in it a sufficient quantity, and the pure dripping only poured off into the basting cup A above, taking care to leave the gravy at the bottom of the cup E, to be used when the Meat is sent to table.

It will readily be seen that by the use of this simple apparatus the great inconvenience and trouble of basting with a spoon, will be entirely avoided, the meat properly and regularly basted with pure fat only, the gravy kept perfectly clean and free from all dirt and cinders, and the Joint or Poultry rendered mellow and handsome for the table.

All will use it who study economy, cleanliness, and comfort.

СИОТДИМЪЯ

PATENT IMPROVED

СУТАРАЧА ДИТАОЯ

DEPOT:

TELETYPE, nearly opposite Trinity Church,
Baltimore, Md. and superior quality of workmanship.

This Apparatus, which has attracted universal admiration, contains a self-acting Battery, with Double Reflectors. Its advantages are—

SAVING OF TIME,
KEEPING BATTERIES
FROM OVERHEATING.

PERFECT CLEANLINESS,
ECONOMY OF FUEL,
AND PRESERVATION OF THE
APPARATUS FROM DANGER OF
EXPLOSION.

It is a most interesting and useful invention, and is well adapted for use in all domestic and public buildings, and is especially suited for the use of the Navy.

For further particulars, and for a full description, apply to the Inventor, or to the Patent Office, Washington, D.C., or to the Patent Office, London, England.

DIRECTIONS FOR USE

DESCRIPTION

Instructions will be found in the accompanying circular.

Folded View of a Plain Shade.

Perforated Shade.

Glass Chimney.

The Patent Folded Shade possesses the advantage of a much more extended surface for reflection of Light, and of being folded into a small compass when not in use; and may be applied to any lamp, by a suitable wire frame.

It reflects a brilliant and soft light on the table, and, at the same time, being transparent, allows sufficient light to pass upwards to illuminate the upper



REMINGTON'S

PATENT IMPROVED

ROASTING APPARATUS,

AND

Self-Acting Baster and Heat Reflectors.

DEPOT:

138, SLOANE STREET, nearly opposite Trinity Church.

This is the most complete and useful Apparatus for Roasting ever introduced to the notice of the Public; by its adoption the following advantages are gained:—

SAVING OF TIME & TROUBLE. GREAT CLEANLINESS.
ECONOMY IN FUEL.
THE MEAT OR POULTRY BEING MUCH IMPROVED IN FLAVOR AND APPEARANCE.

All Epicures and leading Artistes in Cooking declare that without the butter or dripping used for basting be perfectly pure, Meat and Poultry cannot be well cooked; and that **Remington's Apparatus** is the only means by which this desirable object can be accomplished.

*To be seen at the GREAT EXHIBITION, where it attracts universal attention;
also at the ROYAL POLYTECHNIC INSTITUTION, Regent-street.*

DIRECTIONS FOR USE.

In Roasting with this Apparatus, the Joint or Poultry should be hung close to the Heat-Reflector.

If it be necessary to commence basting immediately the meat is at the fire, the basting-cup should be charged with butter or dripping; but if it be the intention to use the fat from the meat only, the bottom cup must be removed when it has in it a sufficient quantity, and the pure dripping only poured off into the basting-cup above, taking care to leave the gravy in the bottom cup, to be used when the meat is sent to table.

It will readily be seen that by the use of this simple Apparatus the great inconvenience of basting with a spoon will be entirely avoided, the meat properly and regularly basted with pure fat only, the gravy kept perfectly clean and free from all dirt and cinders, the joint or poultry rendered mellow and handsome for the table.

*** All will use it who study economy, cleanliness, and comfort. Persons wishing to economize time, will find this the most invaluable culinary article.

MANUFACTURED BY T. F. GRIFFITHS, BIRMINGHAM;

To be had of the Inventor,

138, SLOANE STREET, CHELSEA.

PRICES, 9s. 6d.; 10s. 6d.; & 11s. 6d.



REMININGTON'S PATENT IMPROVED ROASTING APPARATUS, AND Self-Acting Roaster and Heat Reflectors.

DEPOT:

33, SLOANE STREET, nearly opposite Trinity Church.

This is the most complete and useful Apparatus for Roasting ever introduced to the notice of the Public; by its adoption the following advantages are gained:—

SAVING OF TIME & TROUBLE
ECONOMY IN FUEL.
THE MEAT OR POULTRY BEING MUCH IMPROVED IN FLAVOR AND APPEARANCE.

All Epicures and leading Artists in Cooking declare that without the butter or dripping used for basting, the perfectly pure Meat and Poultry cannot be well cooked; and that Remington's Apparatus is the only means by which this desirable object can be accomplished.

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It will use it who study economy, cleanliness, and comfort. Persons wishing to economize time will find this the most invaluable culinary article.

MANUFACTURED BY T. K. GRIFITHS, BIRMINGHAM.
To be had of the Inventor,
133, SLOANE STREET, CHELSEA.

Prices, 3s. 6d.; 10s. 6d.; & 11s. 6d.

James & Robinson, Printers, 20, Lower Sloane Street.

SANATORY IMPROVEMENTS.

ACT XIV VIC. C. 8.

PROVISIONALLY REGISTERED, APRIL 30th, 1851,

BY

WILLIAM POWELL,

2, BARTLETT'S BUILDINGS, HOLBORN.



THE object of this

MODEL OF THE SURFACE OF LONDON BRIDGE

and other specimens, is, to illustrate or explain by simple means a system or method of washing and watering the Streets, Courts, Lanes, Alleys, &c., of the Metropolis and other Towns. The object of the Inventor being by the introduction of his principle (explained by himself), to improve by simple and inexpensive means the health of towns and the comfort of its inhabitants.

The present state of the Streets, Courts, and Alleys, in a Sanatory point of view (London in particular), although much improved of late, and the expensive and inefficient means of cleansing and watering the same, it is unnecessary to allude to here, as it is well known not only to its inhabitants but to its numerous visitors.

The method by which the Inventor purposes to effect his objects in Streets, Lanes, and large thoroughfares, is the substitution for the usual *stone* curb, of one of cast-iron, perforated at the sides, and charged with water at convenient distances from the present mains, and by means of a stop-valve, can always be applied for washing or rendering the Streets sufficiently wet to enable the scavenger to thoroughly sweep and clear away the mud, which a great portion of the year he is unable to do from its adhesive properties; it merely then gets smoothed over to become dust in hot weather, or soft fetid mud in wet, producing dirty foot and carriage ways, and consequently dirty houses in each case. The application for watering purposes is the same, the supply being regulated by local requirements, state of the Streets, Roads, &c.

The mode of application for Courts, &c., is by a perforated Iron Gutter running up the centre or side of Court or Alley intended to be flushed or washed, which operation can be performed in the night time, by a turncock or person appointed, who will be able to wash a large portion of a parish in a very short space of time.

A third method for large spaces is by a Raising and Depressing Fountain, or Distributer, which, when not in use, forms a portion of the road, and consequently not in the way.

Working Models in each of the above cases are shown, as also specimens of the Curb and Gutter.

These Inventions can be applied to water Gravel Walks, Gardens, &c., by simple means from the borders. As regards expense of application, a short calculation will soon prove it small and of little consequence, compared with the improvement the Inventor is sanguine it will effect. He will be happy to afford any information to Sanatory Boards, Corporate or Parochial Bodies, Water Companies, and all parties interested.

Prospectuses will be forwarded, free, to any Gentleman leaving his Card of Address at the Stand, No. 39, *Class 7*, in corrected Catalogue, *Machinery Department*, GREAT EXHIBITION; or Letters addressed as above.

it is unnecessary to allude to here, as it is well known not only to its inhabitants but to its numerous visitors, although much improved of late, and the extensive and efficient means of cleansing and watering the same.

The present state of the Square, Courts, and Alleys, in a sanitary point of view (London in particular), is such as to have had the comfort of its inhabitants.

By the introduction of his principles (explained by himself) to improve the public and private houses the Square, Courts, Gates, Alleys, &c. of the Metropolis and other towns. The object of the present being and other publications, is to illustrate or explain the public means of cleansing and watering and making

OF THE SQUARE OF LONDON BRIDGE

The object of the

A third method has been given by a plan and a description of the same, which, when used in use, forms a portion of the plan and description of the same, which, when

ST. BARTHOLOMEW'S BUILDINGS, HOLBORN.

ST. BARTHOLOMEW'S BUILDINGS, HOLBORN.

BY

PROVISIONALLY REGISTERED, APRIL 30th 1891

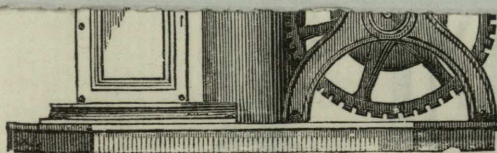
ACT XIX A.D. 1888.

SAVATOKY IMPROVEMENTS.

THE
HAMPTON COURT

"INSIDE FIRE ESCAPES."

"OUTSIDE FIRE ESCAPES" (in the generality of cases) must prove ineffectual in saving human life. The remedy must be found in the general precaution of having "Inside Escapes" adapted to the various sleeping rooms occupied by the principals of large and small houses: so that in cases of alarm, the inmates, having been previously instructed to do so, may at once proceed to the spot where escape and safety are at hand. Inside Escapes made portable, must certainly have the advantage over all fixed contrivances, as they are available at almost any part of the house. Smoke being the invariable harbinger of fire (if no remedy be at hand) generally suffocates, and immediate death follows; and not by burning, as many erroneously believe. Perhaps not one person out of a thousand falls a prey to burning flames, still the death is one the most appalling to survivors. No sight can possibly be more distressing than that of seeing a fellow-creature at the window of a burning house imploring assistance, and no means at hand for a rescue. The awful and terrific alternative of another and almost certain death, by jumping out, has been resorted to by many. Immediate death, in many cases, has followed; and others have escaped with broken limbs, and perhaps become idiots or cripples for life. We might venture to hope, through the combined and varied ingenuity brought to this Royal, August,



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and Noble Exhibition, that some Machine or Machines may be produced, to set aside the general complaint of the want of prompt and effectual escape, and the consequent means of saving human life.

It is one of the national requisites; and on the ground of humanity, has a strong claim upon Government attention: if not under any legal enactment, at least, the legislative patronage should be extended as far as it can. No inventor, we hope, (in this department of Machinery at least) will be found so presumptuous as to suppose that no improvement can follow up his invention; this being one of the principal objects which this Grand, National, and International Exhibition is nobly and wisely intended to accomplish. Some apparent difficulties, but we hope no real ones, may arise, as to the working of these Machines in the hour of fear and trepidation; but the inventor is fully satisfied in thus taking the safety of the persons escaping entirely out of their own hands, that a little occasional practice, (with either Machine) in the absence of danger, would make every person in the house so familiar with it as to place themselves in the Escape Bag without any, or but very little fear. The idea of "economizing" might arise, and some arguments in favour of "simplicity" be admitted; but human life must not be left in the hands of economy to rescue it in the hour of peril; and too much simplicity may be found too little security to save it when danger and death are at hand.

The Inventor of "the Hampton Court Fire Escapes," Nos. 1, 2, and 3, has done his best, and has now come to see others do more.

Hampton Court Palace,

May 1, 1851.

DESCRIPTION.

The Fire Escape No. 1, is, in appearance, nothing more or less than a common Chamber or Dressing Table, and belongs to the list of ordinary household furniture; and if never required for any other purpose, so much the better, and more fortunate for the proprietor; even in this case its expense is not needless to him; and in the hour of his own and family danger, it may prove to be the most valuable piece of furniture in his house.

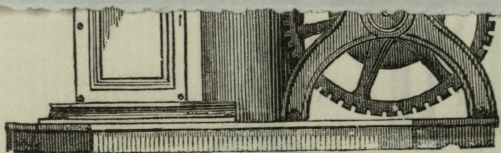
The Escape, No. 2, is so narrowly constructed that it might be placed in an upright position in some sham closet, or even behind the bedstead in any room, as the machinery cannot easily be disarranged. A common holland covering tied round it, would be all that is required to keep it from the dust. Perhaps not so sightly, but equally as useful as No. 1., and somewhat more economical.

No. 3, has all that simplicity can ask,—security demand, or economy require.

** These Machines should be kept as free from incumbrance as possible, so that no difficulty may arise in promptly adjusting them.

Communications, addressed to Hampton Court, either from private individuals or the Trade, will have attention.

R. Buckey



IMPROVED
LANTERN AND REVOLVING APPARATUS
FOR A LIGHT VESSEL,

BY

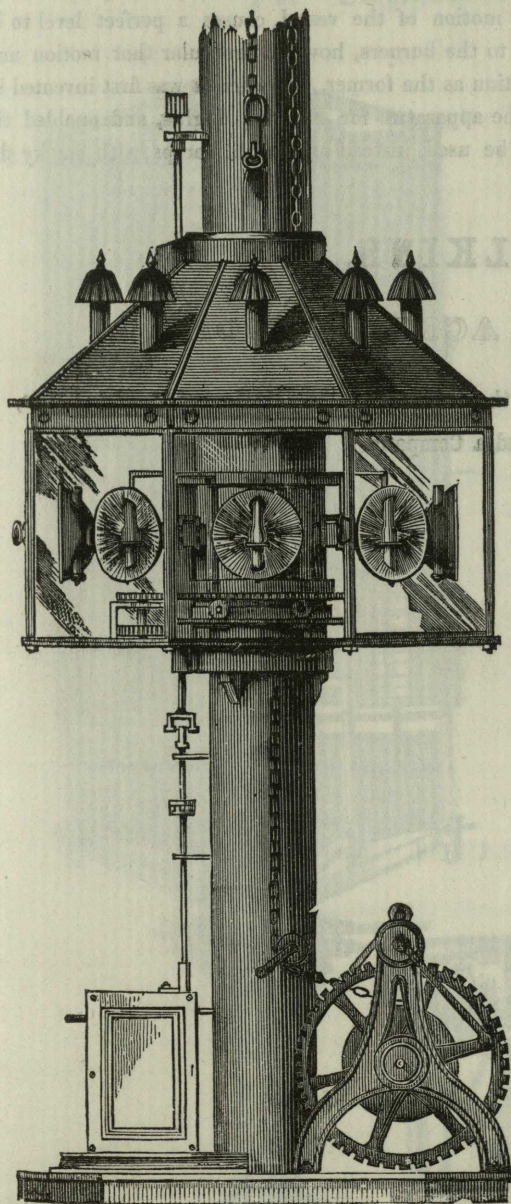
W. C. WILKINS,

Lighthouse Engineer,

24, & 25, LONG ACRE, LONDON;

MANUFACTURER TO THE

HONOURABLE CORPORATION OF TRINITY HOUSE.



THE principal improvements consist in constructing the machinery to work beneath the deck, instead of in the lantern, as formerly. A vertical rod, working in metal bearings, is attached to the mast, with a large gun-metal pinion fixed to the top of the rod, at the height to which it is necessary to hoist the lantern, wherein a train of cog wheels are placed, to connect with the pinion, and communicate the motion obtained therefrom to the traversing apparatus that supports the lamps and reflectors.

The advantages of this arrangement are, that the lanterns can be made much lighter; that the rolling of the vessel caused by so great a weight at the mast head, is greatly diminished; and the machinery being more under control and better protected, works with greater regularity and precision. In the opinion of experienced persons,

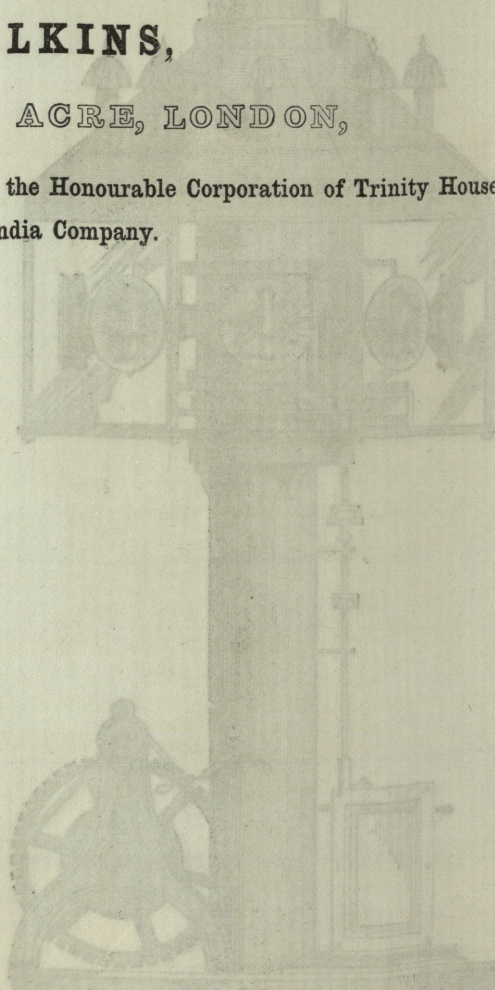
these improvements are most important, and the uninitiated may form an idea of their utility by reflecting that the situations in which the Light Vessels are placed, are at all times difficult of access, and in stormy weather, when accidents are most likely to occur, quite unapproachable; so that it will be obvious any alteration which reduces the liability to derangement, is greatly to be appreciated.

There is also a vast benefit derived from the novel construction of the lamps and gimble work, which, by a movement exactly coinciding with the motion of the vessel, causes a perfect level to be always maintained, and ensures the proper flow of oil to the burners, however irregular that motion may be: that improvement is not of so recent an introduction as the former, but when it was first invented by Mr. Wilkins, it produced a complete revolution in the apparatus for Floating Lights, and enabled the beautiful Argand Lamp, with Parabolic Reflectors, to be used, instead of the old lamps with smoky flat wicks.

W. C. WILKINS,

24, AND 25, LONG ACRE, LONDON,

Manufacturer by Appointment to Her Majesty, the Honourable Corporation of Trinity House,
and the East India Company.



IMPROVED PATENT
REVOLVING CATADIOPTRIC APPARATUS,

WITH SHORT ECLIPSES,

For Lighthouses of the First Class,

MANUFACTURED BY

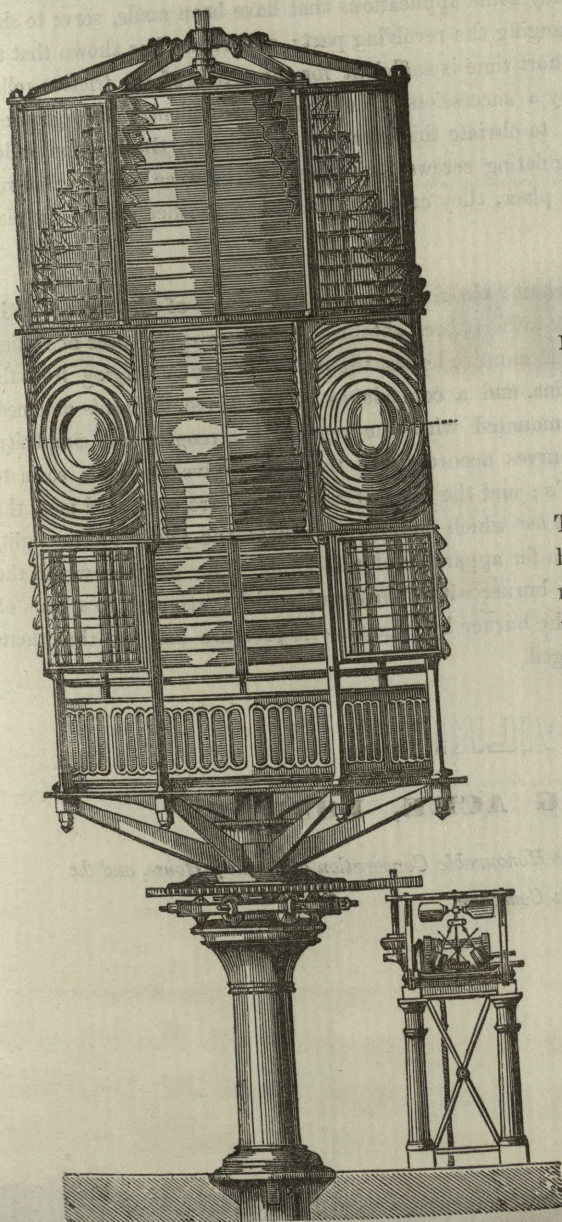
W. C. WILKINS,

24, LONG ACRE, LONDON;

AND

T. LETOURNEAU,

No. 37, ALLEE DES VEUVES, AUX CHAMPS
ELYSEES, PARIS.



THAT appearance of Light, called Short Eclipses, has hitherto been obtained by the following arrangements:—An apparatus for a fixed light being provided, composed of a central cylinder, and of two zones of catadioptric rings, forming a cupola and lower part, a certain number of lenses are arranged at equal distances from each other, placed upon an exterior movable frame, making its revolutions around the apparatus in a given period; these lenses, composed of vertical prisms, are of the same vertical altitude as the cylinder, and the radius of their curves is in opposite directions to those of the cylinder, in such a manner, that at their passing, they converge into a parallel pencil of light, all the divergent rays emitted horizontally from the cylinder, producing a brilliant effect, like that obtained by the use of annular lenses at the revolving lighthouses.

NEW ARRANGEMENTS.—The first improvement which we will describe, has a special reference to the light, and produces a considerable increase

in its power, whilst the simplicity of the optical arrangements is by no means its least recommendation. It consists firstly, in completely dispensing with movable central cylindrical lenses; secondly, it replaces these by one single revolving cylinder, composed of four annular lenses, and four lenses of a fixed light, introduced between them; but the number of each varying according to the succession of flashes to be produced in the period of revolution.

The second improvement, of which already some applications that have been made, serve to show the importance, consists in a new method of arranging the revolving part: experience has shown that the arrangement at present in use is very faulty; a short time is sufficient for the action of the friction rollers revolving on two parallel planes, to produce, by a succession of cuttings, a sufficiently deep groove to destroy the regularity of the rotary movement; to obviate this great inconvenience, the friction rollers are so placed, and fitted on an iron axis with regulating screws, and traversing between two bevelled surfaces, that when an indentation is made in one place, they can be adjusted to another part of the plate which is not so worn.

The third improvement is the most important: the results being an increase of the power of the flashes in revolving lighthouses, to double what has hitherto been obtained. By means of lenses of vertical prisms, placed in the prolongations of the central annular lenses, the divergent rays emerging from the catadioptric zones, are brought into a straight line, and a coincidence of the three flashes is obtained. The whole of the prisms, lenses, and zones are mounted with due regard to strength and simplicity, accurately ground and polished to the correct curves according to their respective positions, so as to properly develop this beautiful system of Fresnel's; and the glass of which they are composed is of the clearest crystal colour, and quite free from that green hue which materially reduces the power of the light, and is considered so objectionable by scientific men for apparatus of this kind. The lamp by which the apparatus is to be lighted, consists of a concentric burner with four circular wicks, attached to a lamp of ingenious construction, the oil being forced up to the burner by atmospheric pressure only, so that there is no delicate pumps or machinery to become deranged.

W. C. WILKINS,

24, AND 25, LONG ACRE, LONDON,

Manufacturer by Appointment to Her Majesty, the Honourable Corporation of Trinity House, and the East India Company.

PATRONIZED BY HER MAJESTY.



THE

ROYAL NATIONAL INSTITUTION

FOR THE

PRESERVATION OF LIFE

FROM

SHIPWRECK.

ESTABLISHED 1824.

SUPPORTED SOLELY BY VOLUNTARY CONTRIBUTIONS.

To encourage the brave and benevolent exertions of both Mariners and others, on the Coast of the United Kingdom, to make attempts to succour Persons of all Nations, whose Lives may be endangered by Shipwreck, the above Institution grants

REWARDS

of Gold and Silver Medals, additional Gold Boats, and sums of Money. The Widows and Orphans of those who may be lost in making efforts to rescue those in Peril, receive also Pecuniary Aids.

These REWARDS are liberally given when daringly earned, whether successful or not, when authenticated by Survivors, or by Officers of the Royal Navy & Coast Guard, Consuls, Lloyd's Agents, Officers of Customs, and Officers of the Mercantile Marine, and other Authorities.

This Institution being of a truly National Character, and extending its operations to all parts of the Coasts of the United Kingdom, every individual, of whatever rank or station in life, has a direct personal interest in its prosperity—never more needed than in these times, when by the more frequent use of Steam Packets, human life is, to so much greater extent, exposed to the Perils of the Deep.

Applications to be made to the Secretary, Mr. RICHARD LEWIS, at the Offices of the Institution, 8, Great Winchester Street, Old Broad Street, London; where Donations and Annual Subscriptions for the support of Life Boats, &c., are urgently requested and will be thankfully received, and at the Bankers, Messrs. WILLIS, PERCIVAL, & Co., 76, Lombard Street; the Institution being supported by the generosity and humanity of Voluntary Contribution.

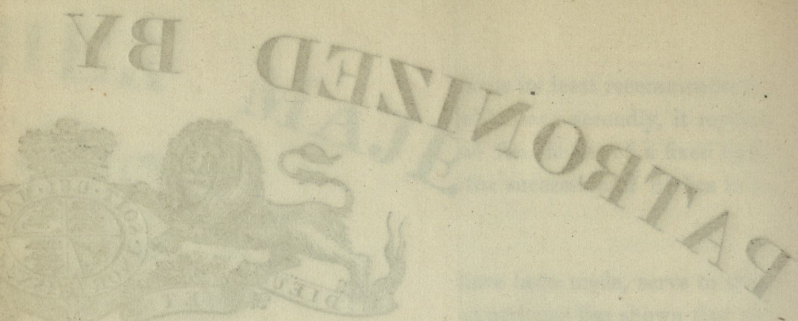
THOMAS WILSON,

Chairman of the Committee.

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THE
ROYAL NATIONAL
FOR THE

PRESTERVA
FROM
SHIP

SUPPORTED SOLELY BY VOLU

To encourage the brave and benevolent exertions of the United Kingdom, to make attempts to succour the endangered by Shipwreck, the above Institution is

REWA

of Gold and Silver Medals, additional Gold Boats, and of those who may be lost in making efforts to rescue

MACHINERY.

CLASS VIII.

NAVAL ARCHITECTURE, MILITARY ENGINEERING,
GUNS, WEAPONS, &c.

The base of the tower and around was used to be a street.

BY HER MAJESTY'S



ROYAL LETTERS PATENT.

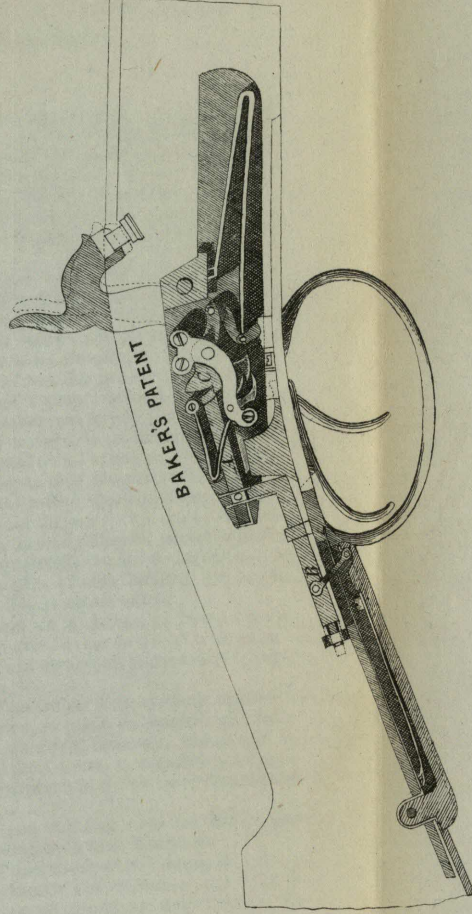
THOS. K. BAKER,

Gun Maker,

88, FLEET STREET, LONDON.

(Near St. Bride's Church Passage.)

PATENTEE OF THE IMPROVED SAFETY BOLT & TUMBLER FOR THE LOCKS OF ALL KINDS OF FIRE ARMS.



A. The safety bolt propelled by the Lever of Guard B. into the Tumbler C. as seen as the Cock is raised from the Wipple, as well as on the full Cock.

The Patentee of the above Gun Lock, begs to call the attention of Sporting Gentlemen & Gun Men to the numerous accidents that happen from the incautious use of Fire arms. It differs from all former "Safety Guns," inasmuch as it acts independent of the Triggers, from being securely bolted into the tumbler in those positions of the "Cock," where accidents have alone been known to occur.

Manufacturer of Guns, Rifles and Pistols of every description.

The book of the ...

89. GREEN STREET, LONDON.

QUIN JAMES

THEO. H. JAMES

THE ...

THE ...

FUSILS BÉRINGER,

RUE DU COQ-SAINT-HONORÉ, 6, A PARIS.



Médaille de Bronze à l'Exposition de 1839, Médaille d'argent à celle de 1844 et une autre d'argent à celle de 1849.

BÉRINGER est l'inventeur du Culot métallique, procédé qui a supprimé complètement la fuite du gaz et le crachement, dans les armes qui se chargent par la culasse. BÉRINGER avait découvert, il y a 15 ans, la solution de ce problème que cherchaient depuis un demi-siècle tous les Arquebusiers français et étrangers. Les améliorations successives qu'il a apportées dans la fabrication de ses produits ont fait, du Fusil BÉRINGER, l'arme de chasse la plus parfaite, la plus économique et la plus sûre qui soit en usage aujourd'hui. On n'a pas encore vu de chasseur, qui après s'être servi du Fusil BÉRINGER une seule fois, ne l'ait exclusivement adopté.

Le plus grand problème pour le perfectionnement de l'arme à feu, de l'arme de chasse surtout, consistait à trouver le moyen d'isoler la charge dans le tournant et de la soustraire aussi à l'influence de l'air et de l'humidité, influence qui viciait tous les systèmes antérieurs et produisait, outre les ratés fréquents, un dégagement de gaz incommode pour la cheminée ou la lumière. L'invention du Culot métallique satisfait à toutes les données du problème.

Dans le fusil système BÉRINGER, le fusil se charge par la culasse. La cartouche se compose d'un tube en cuivre embouti d'une seule pièce au fond duquel s'adapte hermétiquement une capsule circulaire sur laquelle repose la charge. La déflagration qui a lieu sur la circonférence du tube, s'opère par le choc d'une tige d'acier qui traverse la partie supérieure des canons et communique à la capsule la percussion du chien situé à l'extérieur, comme dans les fusils à percussion ordinaire. Ainsi la charge est garantie de tout contact avec l'extérieur par la double enveloppe du tube métallique et du canon lui-même, l'échappement du gaz refoulé par les mêmes obstacles se fait tout entier par la gueule du canon. En outre, la déflagration s'opérant dans l'intérieur du tube, il s'en suit que la crasse s'attache presque entièrement à ses parois intérieures, et respecte le canon qui exige quatre fois moins de lavage que le fusil ancien. Le tube métallique se retire du canon avec la plus grande facilité, au moyen d'un crochet ad hoc et peut être réemployé quinze ou vingt fois au même office.

La facilité qu'offre la cartouche de cuivre pour la proportion de la charge, la largeur de la surface enflammée, en contact avec la poudre et la forme conique des canons, sont trois causes qui contribuent énergiquement à assurer la supériorité du Fusil BÉRINGER, autant sous le rapport de la portée de l'arme que sous celui de la précision du tir.

La rapidité extrême du chargement de l'arme est due à l'invention d'un système ingénieux de bascule, due également à l'auteur. Dans le fusil BÉRINGER, la pièce de bascule est faite d'une seule pièce, ou plutôt c'est le tourillon ou axe qui est d'un seul morceau, tandis que la pièce dite jumelle de la chaîne se sépare en deux parties, dont l'une se détache pour permettre d'enlever les canons sans effort et beaucoup plus promptement qu'on ne le ferait dans l'ancien système.

La facilité qu'a le chasseur de retirer les cartouches du canon et d'ôter ainsi aux maladroits toute occasion de maladresse n'est pas un des moindres avantages du fusil BÉRINGER.

Ainsi, nous n'insisterons pas davantage sur le mérite d'une arme dont l'immense succès commercial et la contrefaçon belge ont victorieusement démontré l'excellence et que le jury des récompenses nationales a honoré trois fois d'une distinction glorieuse dans l'espace de dix ans.

Monsieur BÉRINGER a laissé tomber dans le domaine public son procédé de culot métallique dont les concurrents n'ont pas manqué de s'emparer, et est possesseur d'un brevet de perfectionnement pour le système des fusils exposés. Le prix des fusils perfectionnés de BÉRINGER varie de 250 francs à 1,000 francs, eu égard au lieu de fabrication des canons et des autres pièces.

Les travaux de M. BÉRINGER ne se sont pas bornés à la création du système de fusil qui porte son nom et qui rivalise avec tous les autres systèmes, pour ne pas dire qu'il leur est supérieur. — Il vient encore, récemment, de combiner ses perfectionnements pour les appliquer aux fusils prussiens dits à aiguille, de sorte qu'à part le coulisseau et l'aiguille, l'arme a subi une transformation complète qui permet d'en faire un fusil de chasse ou de tir, et un pistolet qui peut instantanément servir au tir ou dans l'appartement. — L'élégance de ces armes et la simplification de leur construction, le moyen de sûreté et de facilité d'emploi, les feront distinguer de tout ce qui a été tenté jusqu'à ce jour en fait d'innovation. — Ce qui, surtout à l'égard de ce système, avait besoin d'un perfectionnement notable, c'est la cartouche. Celle qu'a imaginée M. BÉRINGER présente à la fois, non-seulement une sûreté complète dans ses effets, mais encore différentes combinaisons en raison de leur usage ou des résultats qu'on veut obtenir. — Enfin, arme et cartouche d'une transformation complète d'exécution pour devenir applicable aux armes de chasse, de tir ou de fantaisie.

VOUITS BÉRIINGER

UNE DE COG-BAINT-REMOUE, D. A PARIS.

1841 et une autre d'argent à celle de 1840.
 Le Bourse à l'exposition de 1849. Médaille d'argent à celle de

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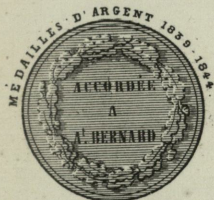
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Tir au Fusil et au Pistolet.



16,

Avenue de la Mothe-Piquet.

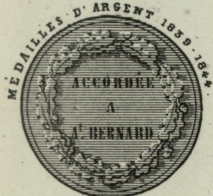


ALBERT BERNARD

Fabricant de Canons de Chasse

PARIS.

Tir au Fusil et au Pistolet.



16,

Avenue de la Mothe-Piquet.



ALBERT BERNARD

Fabricant de Canons de Chasse

PARIS.

BERTONNET

ARQUEBUSIER FABRICANT,

56, passage Choiseul, Paris.

PUN - MAKER,

56, passage Choiseul, Paris.

GEWEHRFABRIKANT,
56, passage Choiseul, Paris.

MONTRE DE GAUCHE N° 7.

	Fr.
1° Trois Fusils non terminés, étude de fabrication, tout fini, chaque.	450
2° Trois Fusils genres variés.	500
3° Un Fusil bruni, noir, platines à trois pièces.	300
4° Un Fusil à bascule, ciselure et gravure au burin à fond creux.	4,200
5° Pistolet de salon gravure à l'eau forte, retouché au burin.	500
6° Deux Pistolets de salons, la pièce.	200
7° Un Couteau de chasse, poignée en fils d'acier, bruni noir.	120

MONTRE DE DROITE N° 8.

1° Une paire de Pistolets de tir, d'un travail présentant de nombreuses difficultés vaincues; l'un est en fabrication, afin de prouver que rien n'est en fonte, que toutes les pièces sont en acier forgé et la ciselure prise sur masse, fini, avec boîtes et accessoires.	6,000
2° Une paire de Pistolets de tir, dans sa boîte.	500
3° Un Fusil à bascule damasquiné en or bois d'embroûme.	1,000
4° Fusil à bascule, bois noir, gravure lustrée.	600
5° Fusil à bascule, gravures Louis XV.	500
6° Fusil à bascule et crosse courbe, pour une personne privée de l'œil droit.	500
7° Trois Fusils à baguettes.	500
8° Un Fusil à baguettes.	450
9° Un Couteau de chasse ivoire vert, poignée sculptée, fourreau et garniture damasquinés en or.	400
10° Canon basculé, pièce de lime.	

STAGE ON THE LEFT HAND N° 7.

	Fr.
1° Three fusils not finished study of the fabrication complete.	450
2° Idem style of steel.	500
3° A fusil, brown, black, platina in three pieces.	300
4° A fusil on hinge chased and graven with burin, ground hollow.	4200
5° A pistol for saloon engraved in aqua fortis touched with burin.	500
6° Two pistols for saloon, each.	200
7° A hunting knife, the hilt in steel-wire, brown and black.	120

STAGE ON THE RIGHT HAND N° 8.

1° A brace of pistols in which all the difficulties previously existing have been vanquished. One of them is in the state of fabrication so as to show, that nothing is faulty that all the pieces are of forged-steel and the chasing made in the material. Complete with boxes and accessories.	6000
2° A brace of pistols with box.	500
3° A fusil on hinge damasked with gold and ebony.	1000
4° A fusil on hing black wood and polished engraving.	600
5° A fusil in the style of Louis XV.	500
6° A fusil on hinge and butt end bent for a person deprived of the right eye.	500
7° Three fusils with ram-rod.	500
8° A fusil with ram-rod.	450
9° A hunting knife handle of green ivory engraved sheath etc.: damasked in gold.	400
10° Barrel hinged; saw-piece.	

LINKE AUSLAGE N° 7.

	Fr.
1° Drey unvollendete Gewehre Gaenzlich vollendete Fabrication: jedes.	450
2° Desgleichen Manier in Stahl.	500
3° Ein Gewehr, braunirt, schwarz mit drey Seitenplatten.	300
4° Ein Zündnadelgewehr, erhabene und tiefe Verzierungen mit feinem Grabstichel.	1200
5° Zimmerpistole, Verzierung geätzt und mit dem Stichel nachgearbeitet.	500
6° Zwei Zimmerpistolen, das Stück.	200
7° Ein Jagdmesser mit Stahlheft, schwarz braunirt.	120

RECHTE AUSLAGE N° 8.

1° Ein Paar Scheibenpistolen von einer Arbeit welche alle Schwierigkeiten als überwunden dargestellt.	
Das eine ist in Fabrikation, um zu beweisen dass nichts aus Gussmaterial, sondern alle Stücke aus geschmiedetem Stahl und die Verzierungen aus der Masse geschnitten sind Fertig mit Etui und Zuehör.	6000
2° Eine Scheibenpistole mit Etui.	500
3° Ein Zündnadelgewehr in Gold damascirt, in feinem Holz.	1000
4° Ein Zündnadelgewehr in schwarzem Holz mit Glanzverzierung.	600
5° Ein Zündnadelgewehr im Style von Louis XV.	500
6° Ein Zündnadelgewehr mit gebogenem Kolben für eine Person die des rechten Auges beraubt ist.	500
7° Drey Gewehre mit Ladstoecken.	450
8° Ein Gewehr mit Ladstock.	450
9° Ein Jagdmesser mit geschnittenem Griff in grunem Elfenbein, Scheide und Garnitur in Gold damascirt.	400
10° Ein Zündnadelgewehrrohr. (Feilenarbeit).	

S'adresser à Londres, à M. Auguste PLOMDEUR, agent de l'Arqueuserie Parisienne,
Scherrard Street, 15, golder Squarre.

150	1. Les Éléments de la Géométrie
300	2. Les Éléments de la Mécanique
200	3. Les Éléments de l'Optique
200	4. Les Éléments de l'Acoustique
200	5. Les Éléments de la Pneumatique
200	6. Les Éléments de la Pyrologique
200	7. Les Éléments de la Méthode
200	8. Les Éléments de la Logique
200	9. Les Éléments de la Métaphysique
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200	12. Les Éléments de la Jurisprudence
200	13. Les Éléments de la Philosophie
200	14. Les Éléments de la Théologie
200	15. Les Éléments de la Poétique
200	16. Les Éléments de la Rhétorique
200	17. Les Éléments de la Grammaire
200	18. Les Éléments de l'Arithmétique
200	19. Les Éléments de l'Algèbre
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THE UNIVERSITY OF CHICAGO PRESS

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ВЕКЛОИИИИ

Fabrique & Magasin d'Armes,

FERDINAND CLAUDIN,

Arquebusier Breveté

S. gar^e du Govt

Rue Joquelet, 1, près la Bourse.

PARIS.

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ET DES

AROUSIER, BREVETÉ,

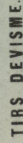
L'établissement fondé par lui a acquis une réputation incontestée; son salon est devenu le siège du *Journal des Chasses*, et c'est aussi à placer un pistolet dans le marbre d'un buste.

Il est auteur d'un petit pistolet d'appartement que l'on peut toujours essayer dans son magasin, à son tir de salon.

Prix

Prix.

1 Fusil à 2 coups, modèle Devisme.....	f
2 Fusil » »	»
3 Fusil » »	»
4 Fusil » »	»
5 Fusil » »	»
6 Fusil » »	»
F Poignard en argent massif richement ciselé, lame en damas de nikel.....	»
G Pistolet éprouvette Devisme pour essayer la force des poudres.....	»
H Boite de pistolets de tir de précision, bois en ébène sculptés richement.....	»
I Boite de pistolets de tir de précision, bois en ébène sculptés richement.....	»
J Couteau de chasse, garde en acier ciselé, poignée en ivoire sculpté.....	»



Il est au-dessous d'un petit pistolet d'appartement qui se trouve dans son magasin, à son tour de son.

REPRÉSENTATION DES OBJETS EXPOSÉS A LONDRES PAR DEVIEME.

Médaille
à l'Exposition 1849

FABRIQUE

Médaille
à l'Exposition 1849

& Magasin d'Armes.

DUCLÓS,

Rue Richelieu 47.

FUSILS
à
BASCULE

FUSILS
à
PISTON

Paris

ERSKINE'S NEW WATERPROOF AND SAFETY GUNS.

These Guns are the Invention of James Erskine, Gunmaker, Newton-Stewart, Scotland; and are valuable on account of their great simplicity of action.

The Gun No. 1, as marked in the Exhibition, is constructed as follows viz:—two covers of Steel hinged to the Breeches of the Gun, which completely protect the caps from the accidental fall of the Hammers. There is likewise a small ring of India Rubber, inserted in the Base of the covers, rendering it impossible for rain or damp to injure the caps. The Sportsman when he caps the Gun has only to press down the covers, and no more attention is required on his part, as they fly open, the moment the Gun is brought to the shoulder.

This is effected by the action of a spring in the Heel Plate, acting upon two small bolts, which unlock the safety covers, and leaves the caps open to the action of the Hammers, as in ordinary Guns.

His Gun, No. 2, as marked in the Exhibition, is a safety Gun without Waterproof for caps, and is constructed as under, viz:—by a bolt working on the the trigger Plate. The said bolt by a spring is constantly held into a groove, made in the heels of triggers, and is only withdrawn, or in other words, unlocked, when the Gun is brought to the shoulder, which allows the triggers then to act. The bolt falling into the groves, as soon as the Gun is again taken from the shoulder, rendering the Gun locked upon all occasions, excepting when presented.

When the Sportsman is charging he is completely safe, from the undischarged Barrel, as the triggers at the charging angle are completely locked, although the Heel Plate however hard pressed on the ground cannot be unlocked.

The Sportsman can by the simple turn of a pin in the Heel Plate, have three descriptions of Gun in a few seconds of time viz:—a safety for the field, a completely locked for the house, or a common Gun in the latter, the safety is locked out, the same condition of Gun being answerable for snap Shooters, who do not bring the Gun to the shoulder.

SEVEN MEN
ON A FOOTPOST AND
SIXTY GUNS

[illegible]

with many of actors
to find out

J. FAIRMAN,

(Many years with J. PURDEY,)

GUN & IMPROVED RIFLE MANUFACTURER,

Waterproof, Percussion, and Anti-Corrosive Caps.

MANUFACTURER OF THE

CHEMICALLY PREPARED CLOTH & FELT WADDINGS,

To PREVENT, the LEADING of GUNS.

Shooting Ammunition and Implement Warehouse.

GUNS ALTERED, REPAIRED, CLEANED & DONE UP AS NEW, &c.,

Improved Four Square and Round Game Markers.

No. 68, JERMYN STREET,
LONDON.

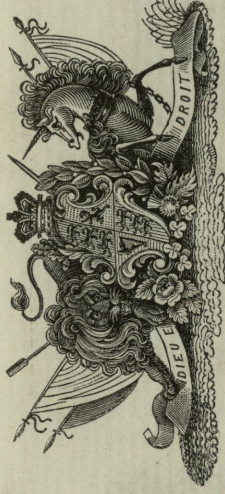
PRICES FOR CASH ON DELIVERY.

Best Double Gun with Oak and Leather Cases, &c., complete	£30.
Best Double Rifles, Two Grooved or Triangular, with Oak and Leather Cases, &c., Complete	£42.
Best Gunpowder (in canisters)	2s. 6d. per lb.
Patent Shot	7s. 0d. per 28-lbs.
Best Tinfoil'd Caps equal to Purdey's &c.	9s. 0d. per 1000.
Caps equal to the Best London Makers	6s. 0d. & 7s. 0d. per 1000.
Chemically Prepared Waddings	3s. 6d. per 1000.
Best Cloth and Felt Waddings Prepared	4s. 6d. per lb.
Thick Felt Concaved Waddings ditto	7s. 6d. per lb.
Best Indented Tubes	20s. per 1000.
Plain Tubes Best	18s. 0d. per 1000.
Eleys Universal 7s. 6d., Royal 14s., Green 17s. 6d. per 12 dozen.	
Black Cases for Guns 15s., and 22s. each. Re-browning Double Barrels 7s. each.	
Polishing, Hardening, &c., Furniture, &c., 13s.	
Revarnishing Double Gun Stock 10s.	
Game Markers Four Square 18s. & 25s. each.	
Ditto ditto Round	
Ditto Books	
Old Guns done up equal to New 30s. each.	

J. FAIRMAN,

(Many years with J. PURDEY.)

Gun, Percussion Cap, and Wadding Maker,
68, JERMYN STREET, LONDON.



THOMAS FLETCHER, GUN MANUFACTURER,

161, WESTGATE STREET, GLOUCESTER.

Exhibitor in the Great Exhibition, 1851.

SECTION 2—CLASS 8—No. 255, in Catalogue.

DOUBLE GUNS,

With Improved Lock, Jointing, and Breeching,

SO AS TO RENDER THEM PERFECTLY WATERPROOF.

The Improvements consist in the following Peculiarities :—

- 1st—The whole of the Percussing being on the Breeching, the Nipple being placed in the centre, thus avoiding the Joints between the Breeching and the Breakoff.
- 2nd—Peculiar construction of the Breakoff, giving greater facility for placing the Barrels in the Stock.
- 3rd—The closeness of the Cocks covering the Caps and Nipples, confining the Gas from the Explosion of the Caps.
- 4th—The application of Platina in the Percussing of the Breeching, preventing corrosion by the Copper Caps.

Price of the Double Guns, finished as in the Exhibition, with Case and Apparatus complete, Twenty-five Guineas.

Ditto, with the Percussing lined with Platina, Twenty-seven Guineas and a half, and upwards.

SECTION 3—CLUES 8—20 333' in Caterpillar

EXAMINATION IN AN EXAMINATION, 1891.

With Improved Lock, Jointing, and Breeching.
THE MESSENGER'S STREET, STONCESTER.

SEE ALSO THE NEWEST SYSTEM FOR THE CITY WATERWORKS.

THE MANUFACTURER'S

The improvements consist in the following particulars:

THE NEWEST SYSTEM OF BREECHING.

The system being placed in the above, thus avoiding the
jointing between the breeching and the breast.

2nd—Possibility of using the same for any greater or less
size of person, the
for placing the

3rd—The closure of the
and the
Cape and Nipples.





FUSILS DE TOUS GENRES de Paris et de fabrique.

PISTOLETS DE TIR, dont l'exacte portée a été éprouvée au banc d'épreuve.

PISTOLETS DE POCHE ET DE CEINTURE, à un et deux coups, dont la détente se referme seule, se chargeant à balle conique d'une portée sûre à la distance ordinaire, et portant leur baguette à calotte dans la crosse.

SPECIALITÉ POUR LES ARMES DE PRÉCISION

CARABINES à un et deux coups, de chasse, de tir et de guerre, avec bayonnette, couteau de chasse, et se chargeant avec la balle conique, à pointes d'acier, dont la force de pénétration est infiniment supérieure aux autres balles.

PISTOLETS ET CARABINES DE SALON.

CANONS à un et à deux coups en acier fondus, à rebans, damas, moucheté, etc.; canons forgés à rubans triangulaires.

TUBES pour les machines à vapeur.

TOUS LES ACCESSOIRES DE CHASSE, tels que carniers riches, et simples poires à poudre de tous systèmes, sacs à plomb, &c.; le tout dans le meilleur goût.

COUTEAUX DE CHASSE et Armes blanches, de luxe et ordinaires, et généralement tous les articles de l'arquebuserie.

TIR AU PISTOLET ET A LA CARABINE A PARIS.

Dans cet établissement, qui est sans contredit le plus beau de ce genre à Paris, M. GASTINNE RENETTE a fait faire pour l'exercice des amateurs, des pièces mécaniques, telles que : jet d'eau soutenant des boules de verre, singe jongleur, arbres, etc., etc. Il y existe de beaux salons, une salle de billard, une salle d'escrime tenue par un professeur, une exposition perpétuelle d'armes de toute sorte, de luxe et ordinaires; on y remarque une machine fort ingénieuse pour charger les pistolets avec la plus grande précision.

TIR AUX PIGEONS ET AUX LAPINS.

M. GASTINNE RENETTE a fait établir aussi à la porte du bois de Boulogne, proche l'Avenue Dauphine, un tir aux pigeons, aux lapins et aux oiseaux, dans un vaste terrain clos de murs.

Cet établissement, qui est une véritable école de chasse, et qui est le rendez-vous de la bonne compagnie de Paris et des Etrangers de distinction, renferme aussi un tir au pistolet et à la carabine à grande distance.

GUNS OF ALL SORTS of Paris and of manufactures.

PISTOLS OF WHICH the exact force has been proved at the bench of proofs.

POCKET-PISTOLS, BELT-PISTOLS, single et double barreled, and of which the trigger shuts alone, being loaded with conic balls of a sure force at an ordinary distance, with capped rammer in the stock.

SPECIALITY FOR ARMS OF PRECISION.

CARABINES single and double barreled for hunting, for shooting, and for war, with hunting knife bayonets and being loaded with conic balls with steel points and of which the force of penetration is far superior to other balls.

PARLOUR PISTOLS AND CARABINES.

ROUGH BARRELS single and double in mottled steel, spiral barrels, damasked-barrels forged with triangular ribbons.

TUBES for steam machines.

HUNTING ACCESSORIES such as sportsmen's pouches handsome and plain, powder flasks of all systems, shot bags &c., all in the best taste.

HUNTING KNIVES and Armes blanches luxurious, and ordinary, and generally all articles of armoury.

PISTOL AND CARABINE SHOOTING IN PARIS.

In M. GASTINNE RENET's establishment, the handsomest in Paris, gentlemen will find every accommodation for exercise, and pleasure, fine drawing rooms, a billiard room, a fencing room kept by a fencing-master, a constant exhibition of all kind of arms. We also remark a very ingenious machine for loading pistols with great precision and several mechanick pieces for the exercise of amateurs such as : water spouts supporting glass balls, juggling monkeys, trees, &c.

PIGEEON AND RABBIT SHOOTING.

M. GASTINNE RENETTE has, close to the bois de Boulogne, near the avenue Dauphine, a large piece of ground surrounded with walls for shooting rabbits pigeons and birds, this establishment is a perfect sporting-school and the rendez-vous of strangers of distinction and of all the good society in Paris.

Boulevard du Mont-Parnasse, N. 77, 93
près la rue du même nom.



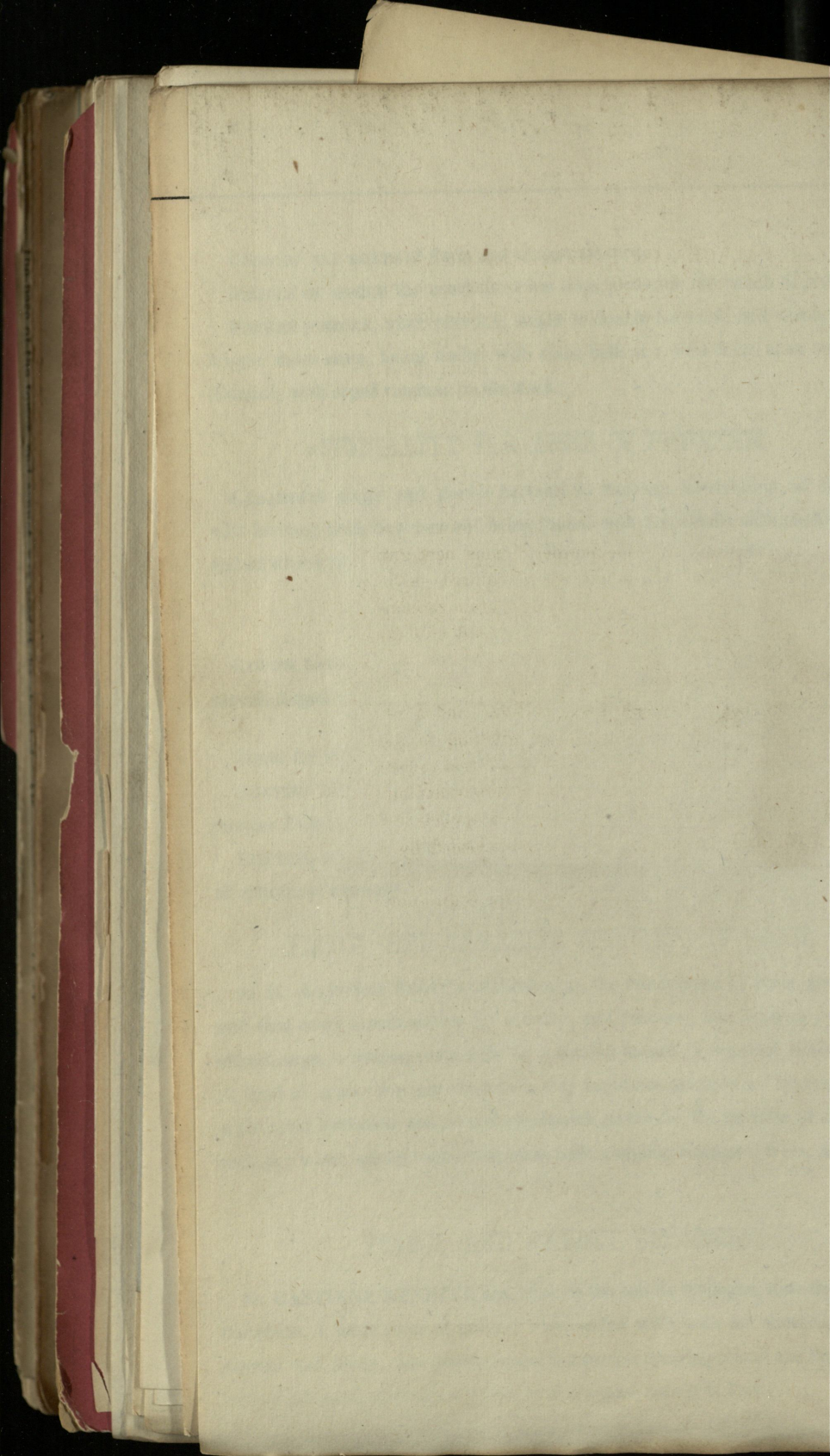
GAUVAIN
Arquebusier.



Voir au Pistolet à la Carabine

... A PARIS. ...

Est. Pistolet & Carabine. 77, Boulevard du Mont-Parnasse.



CRYSTAL PALACE.—Col. P. HAWKER has lately completed a new Double Gun for 1851. It was placed on his counter, in Class 8; though (unfortunately) too late for inspection of jurors, as illness prevented his having it ready in time. But on the only gun of Col. H. that came under official inspection—his last new ignition stanchion—the Jurors have awarded to him the prize-medal “for his improvements and perfection in punt-guns.” The novelty of the new sporting double gun is the self-adjusting primers, without cover or spring, that will not only defy wet weather, but also the saline atmosphere in sea-coast service—in which he has proved the failure of all copper-caps and fine powder. This new gun has conical breechings that will admit, when required—as in wet weather, or at sea,—the use of the largest grain cannon-powder. The proportions of this gun are the result of forty years’ experience; and therefore not according to the new fashion, which is to have very short and dangerously light steel barrels, with disproportionate large calibres, and a revival of the obsolete old groove; instead of adhering to the true and proper elevation. Col. H. refers to all real judges of a gun whether he is right or not in opposing these ridiculous innovations. With the improved ignition—when applied to a SINGLE gun,—the patent breeching is wholly superseded by a saucer-plug, that gives a direct and instantaneous communication, and also extra force, by getting rid of the centre-hole—which is as injurious to the shooting of a detonator as it was advantageous to that of a flint-gun. For Double Guns on the new plan—William Moore and Grey, 78, Edgeware Road. For Duck-Guns and other Single Guns—Alfred Clayton, Lymington, Hants, who has invented and registered an improved handle for the primers of this ignition. Except this, all is free to the trade. No patent. Col. H. takes this opportunity of stating that his repeated visits to Birmingham, and then a long illness, have alone delayed the publication of his tenth edition on “Guns and Shooting.”

in the London Journal, for the week ending May the 24th, 1851, page 190, entitled “Museums, Books, and Nature,” and compare his Specimens with such as the above article alludes to.

O B S E R V E.

AT THE

Great Exhibition of the industry of all Nations!

CHARLES HUBBARD, PRACTICAL NATURALIST,

Is now exhibiting, in Class 8, in the South East Gallery, Foreign department,

The Tourists' Portable Life Boat!

which he invented in 1848. The lightest constructed boat (perhaps) that has as yet been made, considering its strength, buoyancy, and proper boat shape, and its portability; and it is manageable and safe for crossing rivers and lakes. It can be taken to pieces or put together in a few minutes. It can be folded and packed in a case 3 feet 4 inches long, by 12 inches in breadth, and 6 ditto in depth. C. H. has had a man following him for 30 miles a day, through rugged grounds, over hill and heather, with this sort of boat carried at his back, and used, when required, for crossing the lakes, and visiting the islands in them, in search of ornithological specimens in the west highlands of Scotland, and the adjacent isles, during the summer of 1850.

C. H. wishes to inform the lovers of that enchanting study, Ornithology, that, from his long and indefatigable practice, he has been enabled to observe the attitudes and habits of British Birds in general. During the last three summers of 1848,—49,—50, he has travelled through Scotland, and the Western, and Orkney Isles, in the course of which time he has collected, with his own hands, upwards of 4000 specimens of Birds and Eggs! and has persevered so much in the capture of some rare specimens, that he has sometimes kept his clothes on for 14 days and nights in succession, and at times has had very inclement weather to contend with, running, walking, creeping, and watching, without getting more sleep than an occasional wink for a few minutes at a time, when nature could stand it no longer, and he really began to think his heavy water boots would grow to his legs. Now, if practice, with much fatigue, is of any use in teaching one the nature and habits of birds, C. H. has no hesitation in stating that he never met with any one who has gone through so much labour in collecting and preserving those highly important and beautiful objects of nature! whose solitudes, haunts, and breeding places, can only be found and approached with great zeal.

The few specimens of birds now exhibited with the boat, were not originally intended for the great Exhibition. C. H. had intended to fit up some cases of birds, but was informed that ornithological specimens were not admitted, he therefore contented himself by exhibiting the portable Boat and model of a portable Winch, illustrated by the model of a Rock, to show a few of the dangers he has had to encounter in collecting Eggs. But after he came to London with the above-named articles, he was informed that he might exhibit his ornithological specimens, he then sent home for the cases now exhibiting. If any gentleman will call on C. H. at No. 18, ASHLEY TERRACE, CITY ROAD, he will endeavour to give him every information he may require connected with British Birds, so far as his experience has enabled him to discover; and also show some specimens that he has lately preserved, on which he is giving LESSONS on reasonable terms.

C. H. begs leave to call the attention of gentlemen to an article which appeared in the London Journal, for the week ending May the 24th, 1851, page 190, entitled "Museums, Books, and Nature," and compare his Specimens with such as the above article alludes to.

Mr. C. H. has been asked to call the attention of gentlemen to an article which appeared in the *London Journal*, for the week ending May 24th, 1871, page 197, entitled "Lewins, Books and Nature," and compare his specimens with such as the above are referred to.

It is my gentleman will call on C. H. at No. 18, Ashley Terrace, THE ROAD, he will endeavor to give him every information he may require connected with British Birds, so far as his experience has enabled him to do so; and also show some specimens that he has lately preserved, on which he is giving lectures on reasonable terms.

Mr. C. H. has been asked to give him every information he may require connected with British Birds, so far as his experience has enabled him to do so; and also show some specimens that he has lately preserved, on which he is giving lectures on reasonable terms.

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ROYAL HUMANE SOCIETY

INSTITUTED 1774.

FOR RECOVERING PERSONS APPARENTLY DROWNED OR DEAD.

Supported solely by Voluntary Contributions.

THE FOLLOWING ARE THE

Methods of Treatment recommended by the Society. CAUTIONS.

1. Lose no Time.
2. Avoid all Rough Usage.
3. Never hold the Body up by the Feet.
4. Nor roll the Body on Casks.
5. Nor rub the Body with Salt or Spirits.
6. Nor inject Tobacco Smoke or Infusion of Tobacco.

RESTORATIVE MEANS.

If apparently Drowned.

Send quickly for Medical Assistance; but do not delay the following means:—

- I. Convey the body CAREFULLY, with the head and shoulders supported in a raised position, to the nearest house.
- II. Strip the body, and rub it dry; then wrap it in hot blankets, and place it in a warm bed in a warm chamber free from smoke.
- III. Wipe and cleanse the mouth and nostrils.
- IV. In order to restore the natural-warmth of the body—
 1. Move a heated covered warming-pan over the back and spine.
 2. Put bladders or bottles of hot water, or heated bricks, to the pit of the stomach, the arm-pits, between the thighs, and to the soles of the feet.
 3. Foment the body with hot flannels.
 4. Rub the body briskly with the hand; do not, however, suspend the use of the other means at the same time; but, if possible,
 5. Immerse the body in a warm-bath at blood heat, or 100° of the thermometer, as this is preferable to the other means for restoring warmth.

Volatile salts or hartshorn to be passed occasionally to and fro under the nostrils.

- I. No more persons to be admitted into the room than are absolutely necessary.

GENERAL OBSERVATIONS.

On restoration to life, a tea-spoonful of warm water should be given; and then, if the power of swallowing be returned, small quantities of warm wine or weak brandy and water, warm: the patient should be kept in bed, and a disposition to sleep encouraged, except in cases of Apoplexy, Intoxication, and Coup de Soleil. Great care is requisite to maintain the restored vital actions, and, at the same time, to prevent undue excitement.

The treatment recommended by the Society is to be persevered in for three or four hours. It is an erroneous opinion, that persons are irrecoverable because life does not soon make its appearance; and it is absurd to suppose that a body must not be meddled with or removed without the permission of a CORONER.

EVERY INDIVIDUAL, OF WHATEVER RANK OR STATION, has a direct personal interest in the prosperity of this Institution; for who shall claim for himself or family an exemption from the dangers against which it provides?—It is supported solely by Voluntary Con-

If apparently Dead from Intense Cold.

Rub the body with snow, ice, or cold water. Restore warmth by slow degrees; and after some time, if necessary, employ the means recommended for the apparently Drowned. In these accidents it is HIGHLY DANGEROUS to apply heat too early.

If apparently Dead from Hanging.

In addition to the means recommended for the apparently Drowned, Bleeding should early be employed by a Medical Assistant.

If apparently Dead from Noxious Vapours, &c.

1. Remove the body into a cool fresh air.
2. Dash cold water on the neck, face, and breast, frequently
3. If the body be cold, apply warmth, as recommended for the apparently Drowned.

If apparently Dead from Intoxication.

Lay the body on a bed, with the head raised; remove the neckcloth, and loosen the clothes. Obtain instantly MEDICAL ASSISTANCE, as the treatment must be regulated by the state of the patient: the stomach-pump will almost invariably be required to be used; but in the mean time apply cloths soaked in cold water to the head, and bottles of hot water, or hot bricks, to the calfs of the legs and to the feet.

If apparently Dead from Apoplexy.

The patient should be placed in a cool air, with the head well raised, and the clothes loosened, particularly about the neck and breast. Bleeding must be early employed by a Medical Assistant. Cloths soaked in cold water, spirits, or vinegar and water, should be kept applied to the head, which should be instantly shaved. All stimulants should be avoided.

In cases of *Coup de Soleil* (Strokes of the Sun) the same means to be used as in Apoplexy.

Apparent Death by Lightning.

Employ the means recommended for the recovery of persons suffocated by noxious vapours, and pass gentle shocks of electricity through the chest.

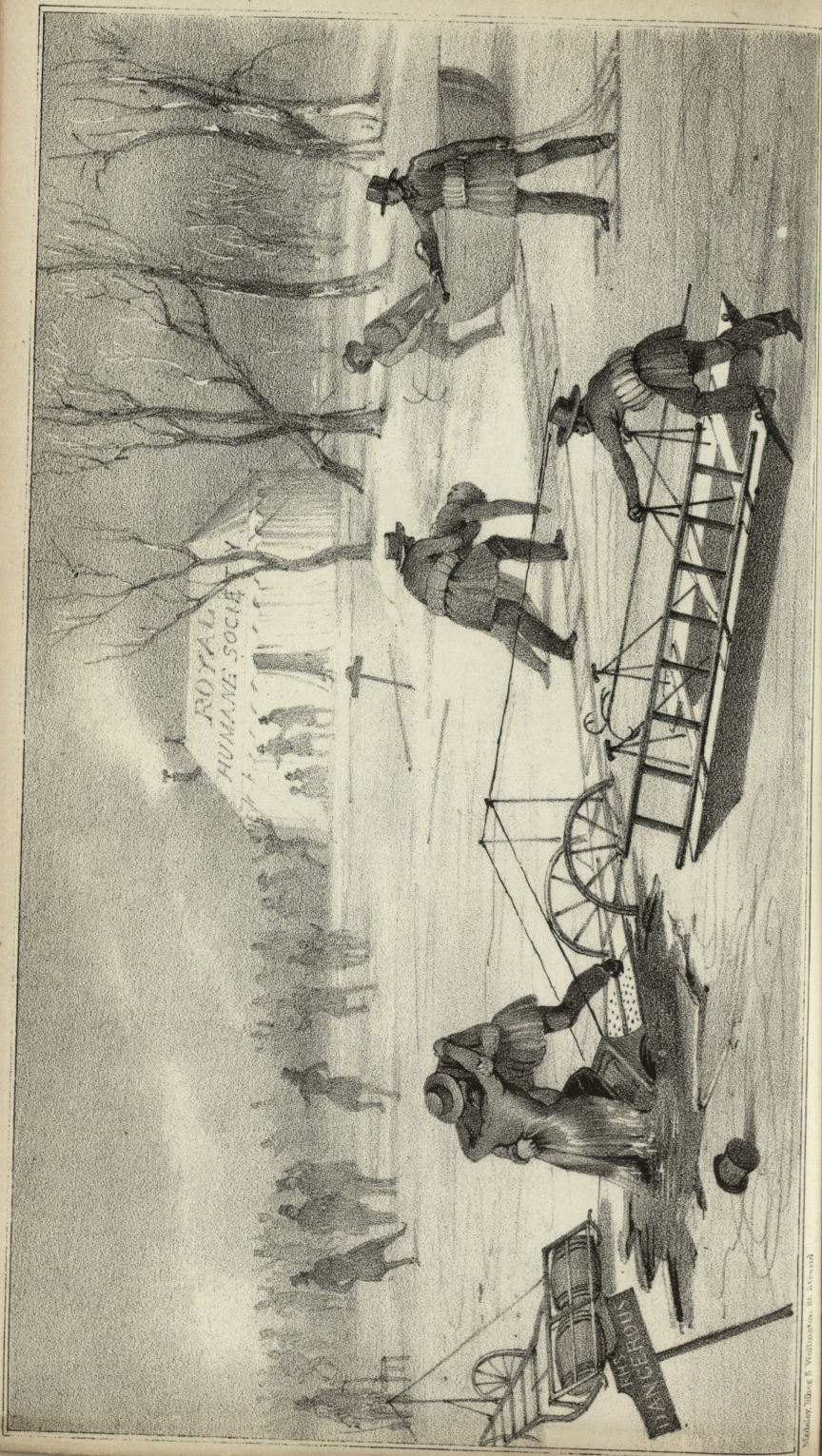
PRECAUTION.—In a thunder-storm it is dangerous to take shelter under a tree, to approach any kind of metal, or to remain in a draft or near the fire-place. The safest way is to remain in the middle of the room, or if in the open air, to lie down on the ground.

tributions: One Guinea *per annum* constitutes an Annual Governor; Two Guineas an Annual Director; Ten Guineas' Donation a Life Governor; Twenty Guineas a Life Director.—Those who are desirous of becoming Life or Annual Governors or Directors, or of making any Voluntary Contributions, are requested to transmit their Names and Subscriptions to any of the following Bankers:—DIMSDALE & Co. Cornhill; DRUMMOND & Co. Charing Cross; Sir J. LUBBOCK & Co. Mansion House Street; to BENJAMIN HAWES, Esq., Treasurer; or to the SOCIETY'S OFFICE, 3, Trafalgar Square, Charing Cross, where all Communications are to be addressed. The Methods of Treatment recommended by the Society may be obtained, gratis.

N.B. Annual Reports of the Society, with the Methods of Treatment at large, in French, German, and English, sold at the Office, price to Non-Subscribers 1s.

OFFICE, 3, TRAFALGAR SQUARE, CHARING CROSS.

JOSEPH CHARLIER, Secretary.



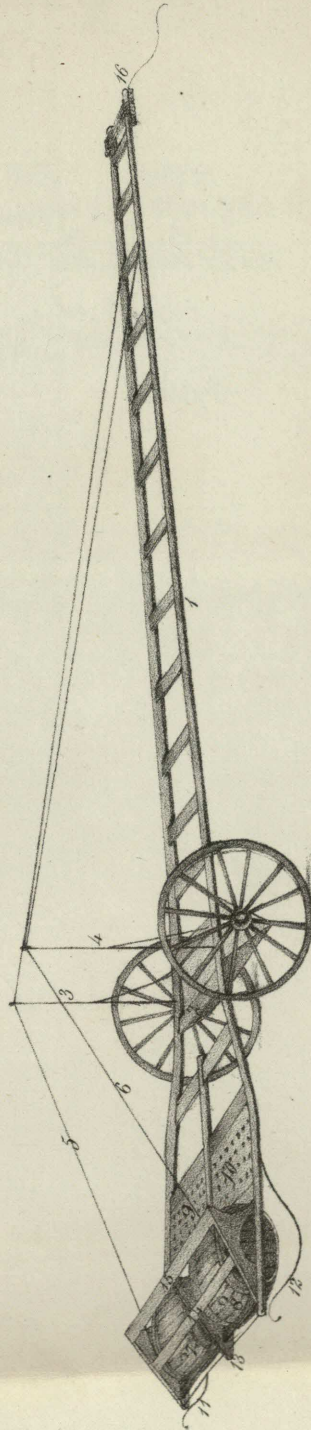
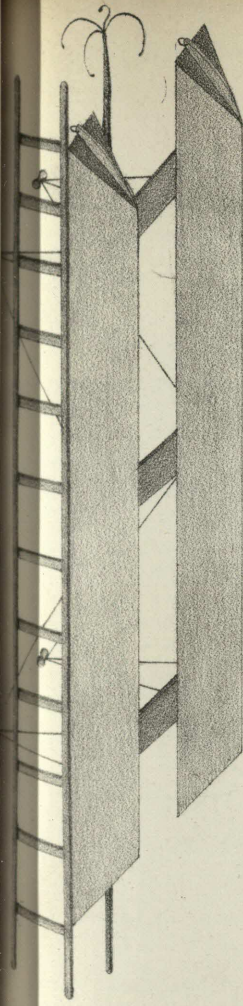
Shape of Breaker



Floating Axle



The Ice Sledge

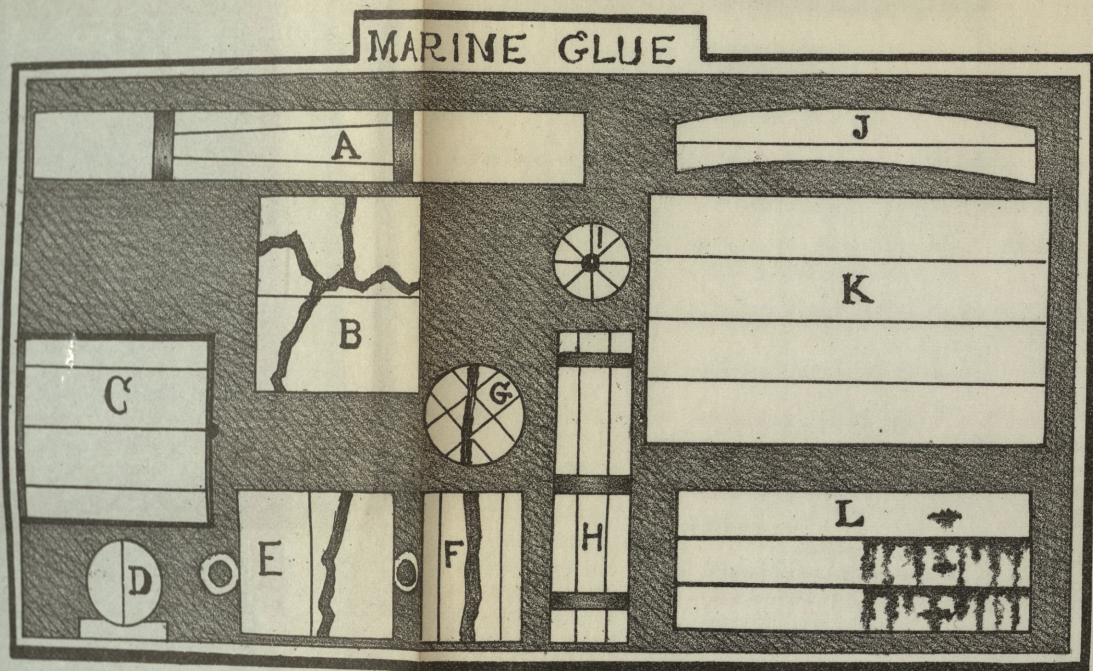


The double Breaker Ladder.

1. Ladder 21 Feet in length - 2. Floating Axle, triangular, 10 inch sides & 2 Feet 6 inches long - 3 & 4. Iron Braces, 2 Feet 6 inches high
- 5 & 6. Strutting Lines of convenient length. - 7 & 8. Breakers, 12 Gallons each. - 9 & 10. Grouings to fit in rounds of the Ladder.
- 11 & 12. Iron Springs, to be made tight, curved enough to keep Barrels off the ground. - 13. Line for catching hold of when in the water.
- 14 & 15. Battens to enable persons in the water, to get upon the Ladder. - 16. Line for pulling the Ladder back, in case of not going straight to the hole, a light line about 12 Fathoms long. This line will be useful in keeping the wheels of the Ladder close to the edge of the Ice when in a hole. - The Wheels, 2 Feet 6 inches high.

Exhibition, Class 6, Patent Marine Glue Stand, near the Transept.

ALFRED JEFFERY, WALSH, & CO., LIMEHOUSE.



1. Piece of the Mast of the "Curaçoa Frigate," found inseparable, even by the wedge, on return from South America.
2. Piece of Mast tested by the Hydraulic press—22 Tons required to make the splinter—
In the Main Mast of a First-rate there are about 1168 feet of surface joined.
In the Fore Mast - - - - - 830 ditto.
In the Mizzen - - - - - 130 ditto.

Total - 2128

The moderate calculation of 3 Tons per foot to the 3 Masts gives 6384 Tons additional strength never before obtained.

- A. Jib tongued and joined with Glue.
- B. Block of Elm joined with Glue and exploded with powder—joint perfect.
- C. Piece of Glued Deck—the interior of the vessel destroyed by fire. Notice both sides.
- D. Oak Cannon Ball joined and fired with 8 oz. powder at Woolwich, in 1842, at an angle of 45 degrees, by the request of the late Sir I. M. Brunel, to try the effect of concussion on the joint when rebounding on the Earth in its fall—joint still perfect.
- E. Deal Block—square foot of surface Glued—wood broke at 4 Tons, thus giving at 3 Tons per foot upwards of 25,000 Tons additional strength dispersed over the Hull of a First-rate.
- F. Model Mast exploded with powder, rending the Timber, not the joints; the Glue confining the splinters.
- G. Section of ditto.
- H. Model Mast made of Northern seasoned Timber—durable and strong.
- I. Section of ditto.
- J. Circular Timber converted from the straight by means of the Glue.
- K. Mahogany Deck payed with Marine Glue.
- L. Two Seams payed with Glue and two with Pitch—exposed to the same temperature—shew the effect of the Sun on the Sides of Vessels under the line.

Exhibition, Class 6, near the Transept.

Mr. JEFFERY, the inventor of the Marine Glue, has the honor to submit, for consideration and inspection, Sketches of various Masts, Decks, &c., to which the invention has been applied in Naval Architecture.

Every one will be best able to judge of the importance and value of the Glue to Government, when he views the specimens, and reflects for one moment on the fact that upwards of 25,000 Tons additional strength is dispersed over the Hull of a First-rate, and 6,384 Tons over the internal surfaces of the Masts. This calculation is much under the actual strength, being calculated at three Tons per square foot, instead of four—the Timber's breaking strain.

A Commission recently appointed by the Admiralty, to collect evidence and report their opinion on the pecuniary value of the Marine Glue, for the past and future use of the Invention in Her Majesty's Navy, with a view to assist their Lordships in the settlement of a claim made by the proprietors for compensation, collected evidence to this effect, viz:—that out of the 130 Vessels which have been glued in the Royal Navy, one caulking and paying with Glue has been found equal to three times with pitch; besides other valuable evidence as to its cleanliness, security, and comfort to crews.

At an examination, some months since in Sheerness Yard, of the Masts and Bowsprits of five Line-of-Battle Ships, all made since 1841-2 of Yellow Pine Timber *without Marine Glue*—sixteen out of twenty were found rotten and condemned, although the Masts of three of the Ships had never been in Commission; while all the Masts and Yards made *with Marine Glue* in 1842-3, have been found, on their return from Foreign service, inseparable even by the wedge—as testified to in Official reports.

Great economy will also be effected in Mast-building, as shewn in a return made by the Surveyor of the Navy on the Masting Sheers at Sheerness, June 29th, 1850, as follows:—

The cost of the Sheers, if made of yellow pine, on the old plan, would have been £1316 10 4

The actual cost of the present Sheers, made of Riga and red Pine, with Jeffery's

Marine Glue, is,	-	-	-	-	-	-	-	-	-	1116 14 0
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Saving in first cost, by the use of the Glue	-	-	-	-	-	-	-	-	-	£199 16 4
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The rapid rotting of these Yellow Pine Masts made on the old method is notorious, and has been so for years; and it was as a remedy for this rotting that the Committee of master Shipwrights attached the highest importance to the Marine Glue;—"stating, that should it be found to retain its great adhesive force, after years of trial in a Tropical climate—Masts for the future might be made of small seasoned Timber, and a great saving effected throughout the Navy.

The evidence of the Right Honourable LORD JOHN HAY, (one of the Lords of the Admiralty,) before the Parliamentary Committee on the Navy and Ordinance estimates in 1848, confirms this important result.—He states,

"It is a well-ascertained fact that the Marine Glue fixes the two pieces of wood together as strongly as the wood itself. I have tried to separate the pieces, but I have not been able to do it: the Glue fixes all those pieces as stoutly as if it was one solid mass of wood."

Evidence of Capt. Right Honourable Lord John Hay, on the Navy expenditure, before a Parliamentary Committee, 1848.—p. 169.

Messrs. JEFFERY, WALSH, & Co., trust that these few facts are worthy the consideration of those who are anxious to economize the public money, and enhance the welfare of Her Majesty's Navy.

Brunton Works, Limehouse, May 1st, 1851.

The evidence of the Honorable Lord John Hay (on the Navy and Ordnance estimate before the Parliamentary Committee) is as follows:

"The rapid rotting of these Yellow Pine Masts made on the old plan for years; and it was as a remedy for this rotting that the Committee recommended the adoption of the Marine Glue;—stating that should the highest importance to the Marine Glue;—stating that should the adhesive force, after years of trial in a Tropical climate—Masts for the seasoned Timber, and a great saving effected throughout the Navy."

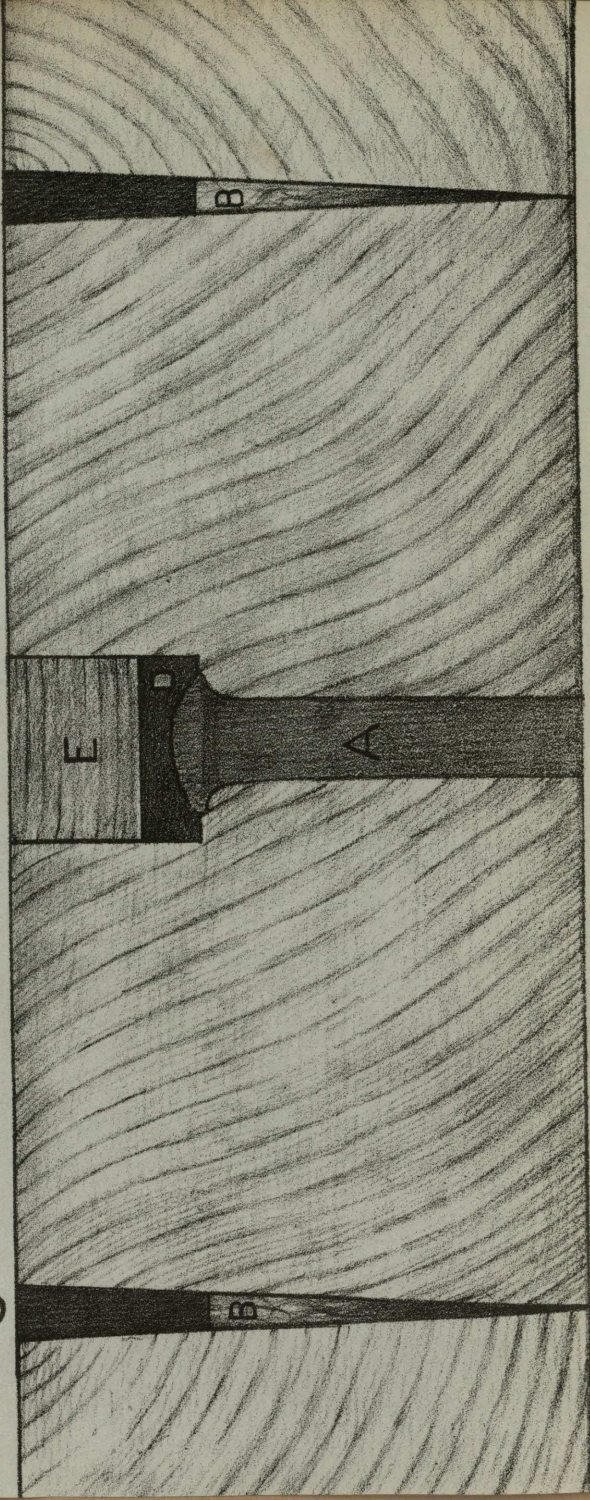
Saving in first cost, by the use



DECKS, WITH JEFFERY'S MARINE GLUE, In Her Majesty's Dock Yards.

C

C



The above Drawing represents the Section of the Deck Planking.—**A** The Nail or Spike.—**B B** The Oakum.—**C C** The Glue in the Seam.—**D** The Glue on the Nail-Head.—**E** The Plug.

Iron Nails to be used instead of Copper Metal Nails.

PAYING AND CAULKING THE DECKS.

In laying New Decks the Planks to be slightly bevelled in the ordinary manner. The situation of the Nail-head to be countersunk with a 7-8th-inch *centre-bit* to the depth of an inch; previous to the Nail being driven. Afterwards the Nail to be completely covered with a small quantity of the Glue, and a Plug dipped in Glue to be driven down upon it, as shown in the Drawing.

The Oakum to be laid well down in the Seam *hard*, leaving *one inch* for the Glue in the Seam, and, as usual, to be payed immediately after the caulking.

Naphtha or Coal Oil to be used for dipping the caulking irons, as Linseed Oil or Grease prevents the Glue from adhering to the edge of the Plank.

MELTING THE MARINE GLUE.

STRICT ATTENTION REQUIRED.—Cut the Glue into small pieces; melt in a pot over a moderate *Coke* or *Charcoal* fire, keeping it *constantly* stirred all the time it is melting. *Note.*—When the Glue is all melted the heat is about 212° Faht., but much too thick to run into the Seams, and if used in this state will cause air-bubbles in hot weather; therefore it requires boiling and stirring a few minutes longer, when the heat will rise to 300° Faht., it then becomes perfectly liquid, and should be used as quickly as possible.

APPLYING THE MARINE GLUE.

In Paying the Decks, the Glue should be poured from the ladle into the Seams, holding the nose of the ladle an inch from the deck. *Note.*—If the ladle is drawn on the Seams, as it is frequently done when pitch is used, a quantity of atmosphere is enveloped, and has not time to escape before the Glue becomes set: this also will cause air-bubbles in hot weather.

When the Decks have been payed with Pitch or Rosin, in order that the Glue may adhere to the edge of the Plank, the old materials to be broken out, and a *race-knife* used to clear the Seams, and afterwards caulked or hardened down, as may be required, to the depth before described.

PARTICULAR NOTICE.

The Glue being insoluble in water, has no affinity for it, therefore a perfect contact cannot be formed with wet or damp substances. Dryness of the surface is absolutely necessary to obtain a perfect adhesion.

Oil, Grease, Dust, and Dirt, must be avoided.

Excess of boiling and repeated melting injures the Glue; therefore melt no more than is required for immediate use. Should any remain in the pot, pour it out on stone or sheet iron, and mix it with fresh Glue when required.

CLEANING OFF.

The Deck to be *Adzed* and *Planed* off on any following day, or when the Vessel is put in Commission.

By Command of the

LORDS COMMISSIONERS OF THE ADMIRALTY.

DECEMBER

IN HER MAJESTY'S DOCK YARD

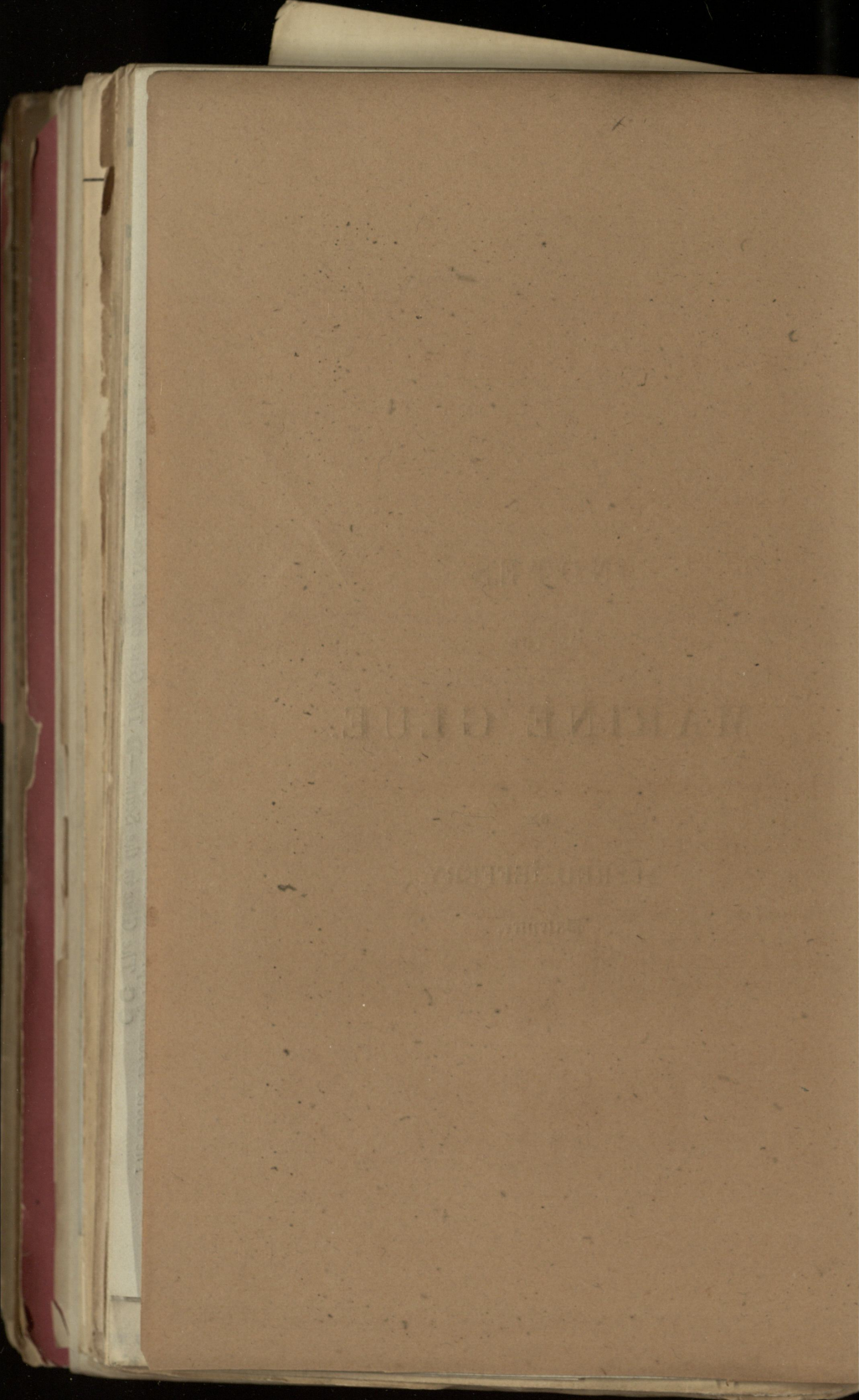
WILLIAM HENRY & SONS LTD

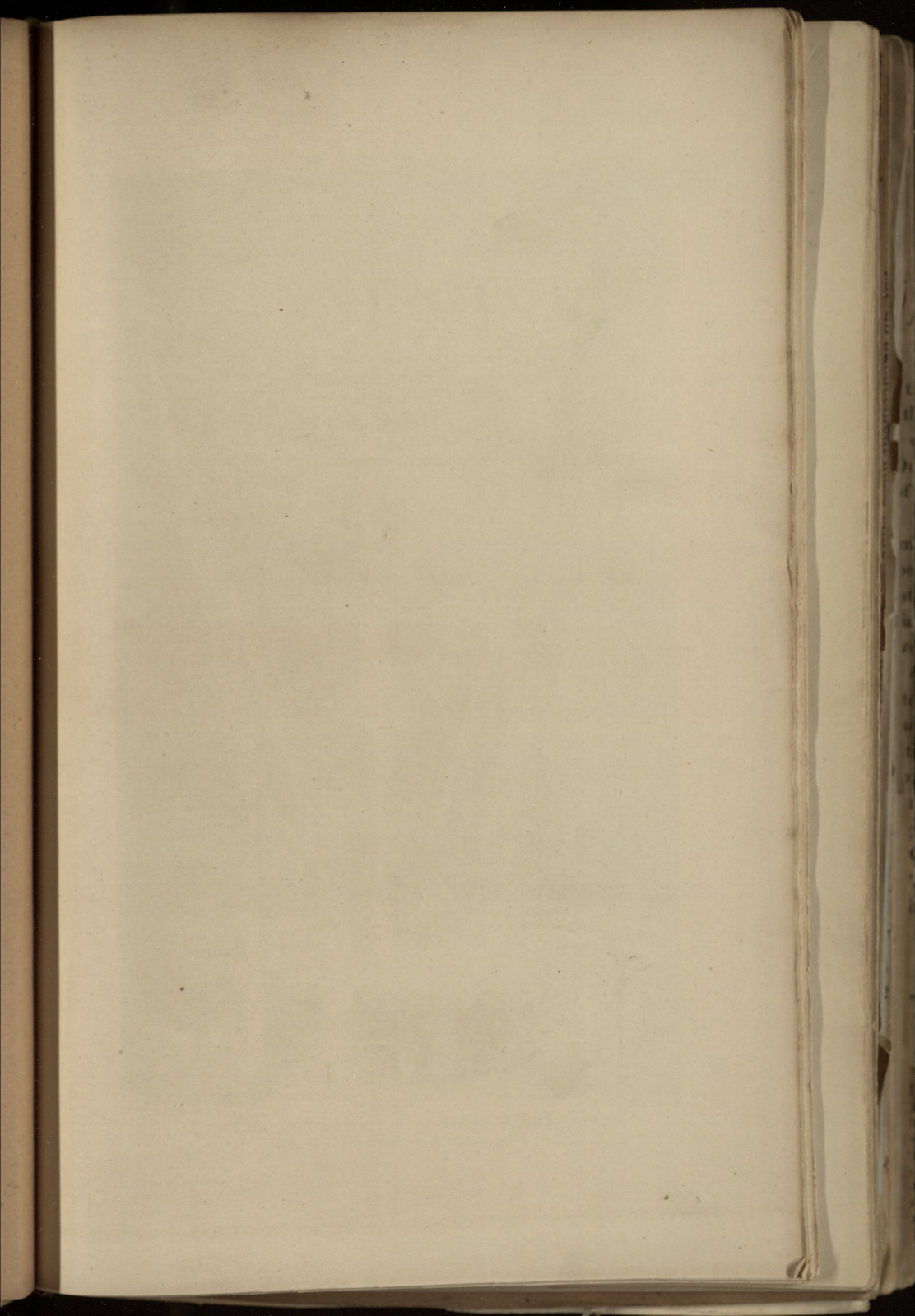
NOT BE OVERLOOKED

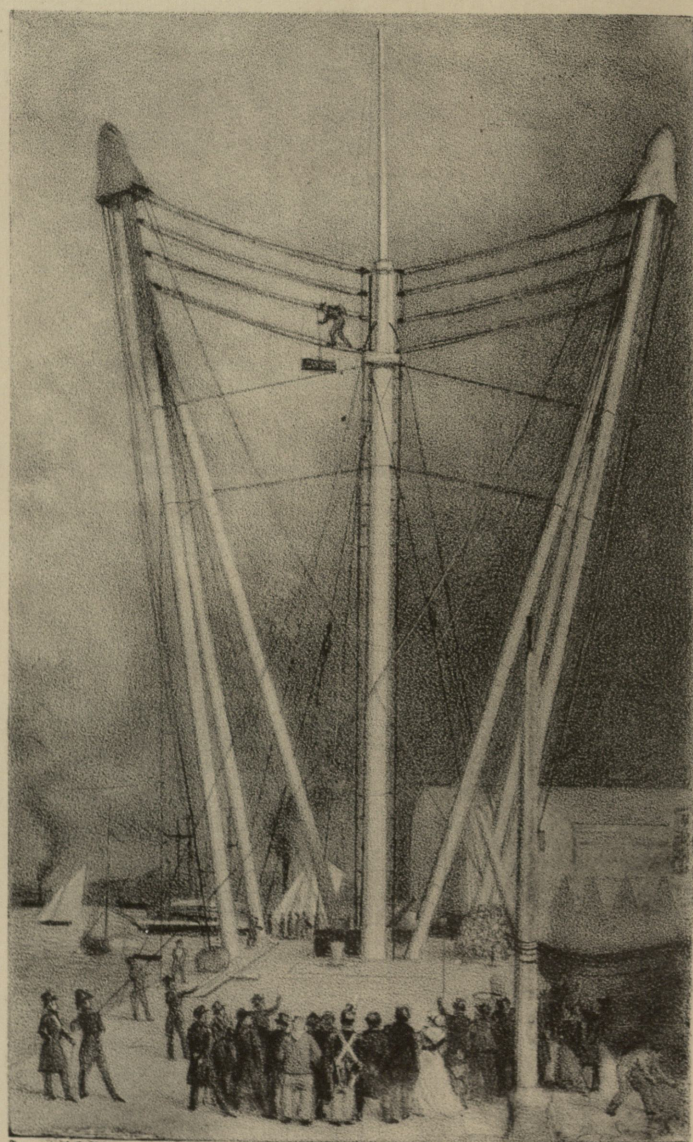
NOTES
ON THE
MARINE GLUE.

BY
ALFRED JEFFERY,

Patentee.







Drawn by A. Jeffery

Engr. by J. B. Walsh

EXPERIMENT FROM THE TOP OF THE SHEARS,
AT WOOLWICH.

NOTES
ON THE
MARINE GLUE.

BY
ALFRED JEFFERY,
Patentee.

TO WHICH IS ADDED,
A NUMBER OF TESTIMONIALS
AND
GENERAL INSTRUCTIONS FOR THE APPLICATION.

“Le cose che sono fondate nella virtù, ancorche il principio paia molte volte basso e vile, vanno sempre in alto di mano in mano: ed insino a ch' elle non son arrivate al sommo della gloria non si arrestano, ne posano giamai.”

VASARI.

LONDON:
BRUNTON WORKS, LIMEHOUSE.

1844.

NOTES
ON THE
MARINE GLUE

ALFRED J. EVERTS

PHOTOGRAPH

THE PHOTOGRAPH

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THE PHOTOGRAPH

THE PHOTOGRAPH

THE PHOTOGRAPH

1844

NOTES

TO COMMODORE

SIR FRANCIS AUGUSTUS COLLIER,

C. B., K. C. H.,

Captain Superintendent of Her Majesty's Dock-yard at Woolwich,

THIS ACCOUNT OF AN INVENTION, WHICH WAS AT AN EARLY STAGE

HONORED BY HIS CAREFUL INVESTIGATION, SANCTIONED BY

HIS APPROVAL, AND PROMOTED BY HIS KIND ASSISTANCE,

IS INSCRIBED, WITH GRATEFUL RESPECT, BY

ALFRED JEFFERY.

TO COMMISSIONER

SIR FRANCIS AUGUSTUS COLLIER

C. F. R. C. H.

Report submitted to the Mining Department in London

THIS REPORT ON THE INVESTIGATION WHICH WAS AT AN EARLY STAGE

REPORTED AT HIS CARBON INVESTIGATION, HANDLED BY

ITS APPROVAL, AND PROMOTED BY HIS KIND ASSISTANCE

IS DESCRIBED WITH GRATITUDE IN

ALFRED JEFFERY

NOTES

ON THE

MARINE GLUE.

It may gratify curiosity to know something of the origin of this discovery. The writer, who was one of the early producers of copper plates by galvanic action, conceived the notion that the manufacture of copper sheathing for vessels might be improved by that process. He accordingly turned his attention to this subject, but finding that he could not diminish the cost of production below that of plates made by the ordinary method, and also that the waste by oxydation on the one hand, and on the other hand the mischief of foul bottoms when oxydation was checked, formed insuperable barriers to his success in the application of this process, he desisted from the attempt.

In the course of his reflections on the subject, the idea occurred to him of applying gums insoluble in water, as a protection for the bottoms of Ships; and he conceived that by combining elastic gum with non-

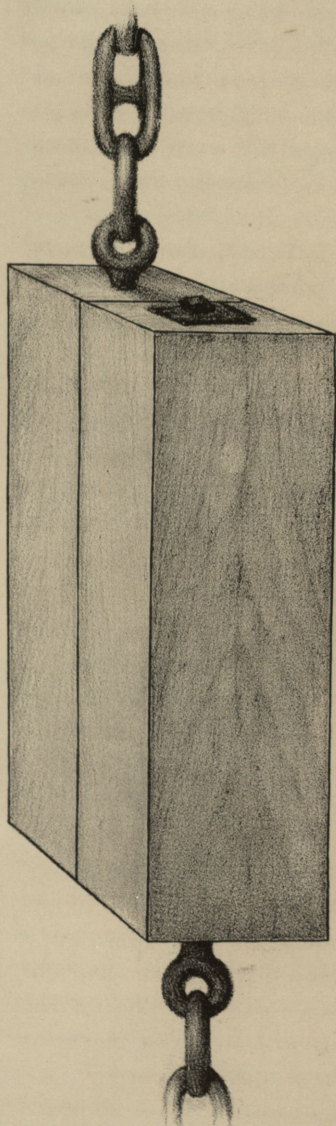
elastic, and charging the whole composition with ingredients destructive both to animal and vegetable life, the object he had in view might be effectually attained; inasmuch as such a coating would protect the timbers from the contact of the water, and also prevent any adhesion or accumulation of animal or vegetable matter, and resist the attack of the Ship Worm, (*Teredo Navalis*.)

Under this impression, the writer commenced a series of experiments, and, after much trouble and perseverance, succeeded in producing a composition likely to realize all his wishes and expectations. He then deposited a sealed paper descriptive of his discovery in the Record Office of the Admiralty, with a statement as to the probable effect of the composition, and at the same time several blocks of wood were sunk in Portsmouth Harbour, and there submitted to the test of an experiment, the result of which will be stated in a subsequent page.

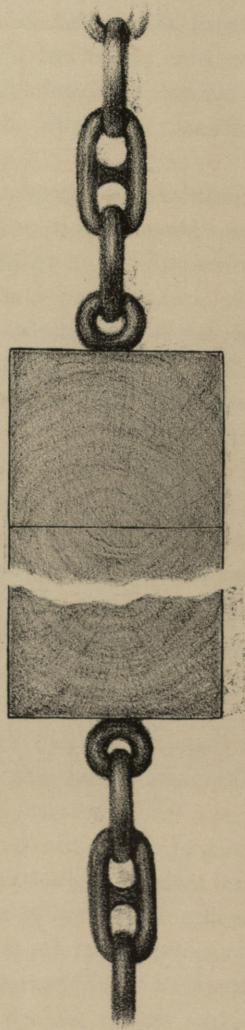
In the course of his researches and experiments with gums, the writer discovered the composition now called the Marine Glue, possessing properties most useful and important for ship-building, and other purposes.

The timbers which compose a ship are exposed to constant strain from the winds, the waves, and other causes, from the time the ship is launched until she is broken up. What then are the qualities required in a substance used to join those timbers? It must be a substance insoluble in water, or it would be useless; it must be impervious to water so as to prevent leakage; it must be elastic so as to contract and expand according to the strain on the timber, or the vicissi-

A



B



tudes of heat and cold ; it should be sufficiently solid to fill up the joint and give strength ; and it should be adhesive so as to connect the timbers firmly together. That these properties are all combined, in an eminent degree, in the Marine Glue, will appear by a plain statement of some of the experiments which have been made.

Plate 1, fig. A, represents two pieces of African Oak, 18 inches long, by 9 inches wide, and $4\frac{1}{2}$ inches thick, joined together longitudinally by the Marine Glue, with a bolt of $1\frac{1}{4}$ inch in diameter, passed through each of them from end to end. The day after the Marine Glue had been applied, the blocks were tested, by means of the hydraulic machine in Woolwich Dockyard, in the presence of Sir Francis A. Collier and the Master Shipwrights of the Queen's Dockyards at Plymouth, Portsmouth, Sheerness, Chatham, and Woolwich. A strain was applied to the extent of 19 tons, at which point one of the bolts broke, but the junction of the wood by the Glue remained perfect. Two bolts of $1\frac{1}{2}$ inch diameter were inserted on the following day into the same block, and the strain was again applied, until it reached 21 tons, when one of the bolts was broken ; the junction of the wood still remaining perfect, and apparently not affected.

Fig. B, in the same plate, represents two blocks of African Oak of similar dimensions, but bolted in a different manner, so as to apply the strain at right angles, to the junction made with the Glue at the centre. The wood split as represented in the plate, at a strain of 4 tons, but the joint remained perfect.

The result of these experiments was deemed more

extraordinary by those assembled, inasmuch as African Oak is a very difficult wood to unite.

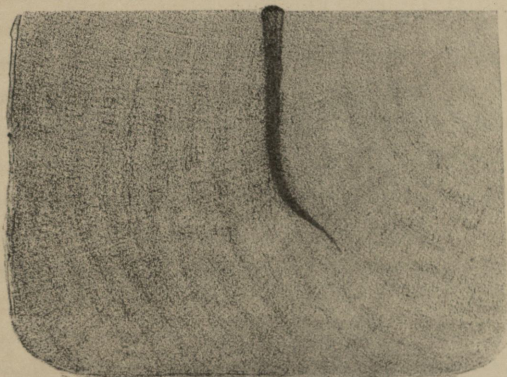
Numerous experiments have been made to ascertain the best proportions of the mixture constituting the Marine Glue for various sorts of wood; and in one case, where it was applied to elm, it resisted a strain equal to 368 lbs. on the square inch, when the wood gave way. These blocks were glued, then immersed in water, and on the next day were taken out and tested.

In the frontispiece to this pamphlet is a representation of several large pieces of timber glued together, and suspended to the top of the Shears in the Dock-Yard at Woolwich, at a height of about 70 feet above the ground. From that elevation they were precipitated on to the granite pavement below, in order to test the effect of concussion. The wood was shattered and split, but the Glue yielded only in a case in which the joint was badly made, and after the third fall. This falling from a height on to a hard substance, is a very severe test of concussion. The explosion of a shell has greater power in rending wood, but does not produce so great an amount of vibration.

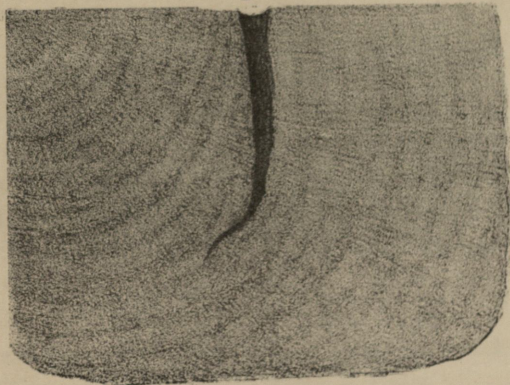
From the elastic nature of the Marine Glue, it contracts when the timbers to which it is applied are swollen by water, and expands when the timbers shrink from heat, or any other cause.

Plate 2, has two representations of a large block, having a rend (or fissure) filled up with Glue. Fig. A represents the block with Glue in the rend as it appeared after immersion for a month in the Mast-pond at Chatham, at a temperature ranging between 30 and 40° Fahrenheit. Fig. B, represents the appearance of the rend after the same block had been a month in

A



B



the Chatham Hoop-house, at a temperature from 70° to 80° Fahrenheit. This block experiment is still going on, and it is intended to place the block in the Hoop-house and Mast-pond alternately for the space of a year; and the writer, from his experience in other cases, has no doubt that the result will be equally successful. In preparing the Glue, its elasticity may be increased or diminished, as circumstances may require.

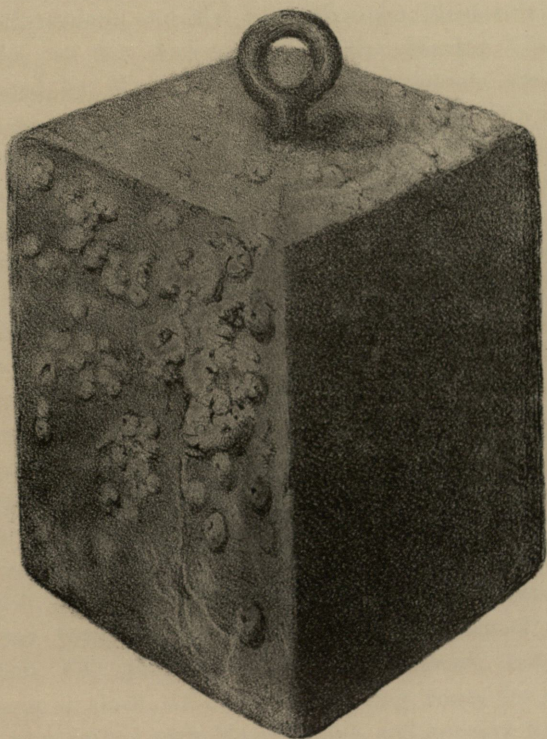
This quality renders the Glue most valuable, as a remedy to be applied to the rends and fissures of timber; and in fact it renders defects of that nature of little consequence—a result, of which the practical shipwright will perceive the immense importance. It is also available with peculiar advantage for the seams of vessels in lieu of pitch: seams which were payed with it in 1841, and have been exposed to the heat of two summers, appear but little changed, and are quite free from leakage, although they were executed under very unfavourable circumstances. For the deck seams it will be found peculiarly suited; and where it is used the crew will never have reason to complain of the Glue sticking to their feet. The surface of the seams after heavy rains, or from a damp atmosphere, will become slightly convex, and under a warm temperature will become slightly concave; but it will not liquefy by solar heat, and it will under all circumstances adhere with its original tenacity. All practical seamen will perceive the vast importance, in point of economy, comfort, and security from leakage, which these qualities ensure, especially in hot climates.

Plate 3, represents the result of an experiment, with reference to the composition intended as a substitute for copper sheathing. This composition

was applied, without poison, to four surfaces of the blocks, and on the other two sides it was applied in combination with poison, equally destructive to animal and vegetable life. After the lapse of 23 months these blocks were taken up, and were found to present the appearances represented in the plate: that is to say, small shell-fish were adhering to the four unpoisoned sides, whilst the two sides charged with the poison were perfectly clean. The whole of the composition was slightly changed in colour, but was not deteriorated or affected in respect of its useful qualities.

Another most important use of the Marine Glue, consists in its application for the construction of Masts. Its power of adhesion and elasticity, admirably fit it for the purpose of joining the spars of which Masts are composed. A great reduction of expense is likely to follow its adoption for this purpose, as shorter and smaller timbers may be rendered available, and most of the internal fastenings may be dispensed with.

The following account of some experiments on this point, is taken from the Army and Navy Register for February, 1843, and also appeared in several of the daily Journals. The Masts alluded to, have been glued with such proportions of elasticity given to the Glue, which deflect in about the same ratio as the wood itself, or as if the wood were in one solid piece.



EXPERIMENTS WITH THE MARINE GLUE.

“Experiments were carried on, January 4th and 5th, at Chatham, in the presence of Capt. W. H. Shirreff, Superintendent, and Mr. John Fincham, Master Shipwright, at the dockyard, with the Marine Glue, invented by Mr. Jeffery. The experiments which were carried on last year at Woolwich, with the view of proving its immense adhesive power, and that it would be more difficult to separate the joinings made with it, than it would be to tear the solid wood in pieces by shots from the large guns of the Ordnance, and the result of the trials, so convinced the Master Shipwrights then assembled to consider improvements which might be brought forward for the benefit of the Royal Navy, that they recommended its adoption, and its application to naval purposes was approved of by the Lords Commisioners of the Admiralty. The mainmasts of the following vessels have been joined with it, under the instructions of Mr. Jeffery:—The mainmast of the *Eagle*, 50 gun ship, was first fitted with it, and it now stands exposed to all the changes of our variable atmosphere: the mainmast of the *Goliah*, 120 gun ship, built at Woolwich, but at present in dock, at Chatham, getting ready for sea, has been joined with Marine Glue, and appears to be finished in a most substantial manner; and some idea may be formed of the number of joinings, when it is stated, the dimensions of the mast is 125 feet in length, with a diameter of 40 inches. The mainmast of the *Curaçoa*, formerly a 32 gun ship, but at present being

reduced to a 24 gun vessel, is in progress of being joined with the composition. The whole of the practical workmen speak highly of its merits, and have expressed an opinion that its general use will save a great amount of labour in placing internal fastenings, which may now be nearly dispensed with.

"The experiments formerly made and tested, were undertaken at a period when a high degree of summer temperature existed, and it was imagined by some that it would be difficult to use it in winter, so as to have equal adhesive and strengthening powers. In order to satisfy himself on this point, the inventor had several pieces joined together during the present cold weather, and the following is the result of the trials of their qualities:—

"Eight pieces of wood 12 feet long, and 6 inches in diameter at one end and 5 inches at the other, were each cut lengthways into four pieces, and joined together with the Marine Glue, two of the pieces with a new sample of the composition, and the others in the usual manner, only varying the proportions of shellac of $\frac{6}{17}$ and $\frac{9}{17}$.—These pieces of wood were alternately attached by strong bolts to the floor of the mould loft; and an iron collar and chain having been placed in the centre, the following weights were placed on a balance to shew the deflection or strain.—No. 1, with the new sample, with a strain of 25 cwt., bent 3 inches exactly, and on the withdrawal of the power returned to its former position with the greatest elasticity. No. 2, with a strain of 27 cwt., only yielded $2\frac{1}{8}$ inches. No. 3, with a strain of 27 cwt., bent $2\frac{3}{8}$ inches. No. 4, with a strain of 27 cwt., yielded $3\frac{3}{8}$ inches, having been joined by the new sample. No. 5,

with a strain of 27 cwt., showed a deflection of $2\frac{1}{2}$ inches. No. 6, with a strain of 27 cwt., only yielded 2 inches. No. 7, with a strain of 27 cwt., bent $1\frac{7}{8}$ inches; with $29\frac{1}{4}$ cwt., $2\frac{1}{8}$ inches; with $31\frac{1}{2}$ cwt., $2\frac{1}{4}$ inches. It was then attempted to break this model mast, and additional weights were put on, until it amounted to 45 cwt., when the strain made it yield $3\frac{1}{4}$ inches, and fractured the upper part of the wood, but did not separate the joinings or thoroughly break the wood, and afforded those present an opportunity of satisfying themselves that the joined pieces were far stronger in every respect than solid wood of the same dimensions. No. 8, was tested in a similar manner and with a strain of 45 cwt., yielded $3\frac{1}{2}$ inches, and at one end the joining opened a little in one direction, which will afford the inventor an opportunity of judging of the best degree of mixture of the various substances of which it is composed."

The writer apprehends that the extraordinary utility of the Marine Glue will not be fully appreciated, until vessels, in the construction of which it has been applied throughout from the keelson to the main-top, shall have been exposed to disasters in which ordinary vessels would go to pieces, or founder from leakage; in many such cases he trusts the superiority of the Marine Glue will hereafter be manifested, in the preservation of vessels, together with the property and lives of the persons on board.

No attempt is here made to enumerate the various constructions, such as Dock Gates, Piers, Aqueducts, Floating Bridges, &c., &c., to which the Marine Glue may be applied with advantage, the present design being simply to point out some of its principal qualities as shown by experiments.

Since this invention was first brought forward, the writer has been in constant communication with numerous individuals in the Naval Branch of the public service; and he cannot dismiss these imperfect notes without expressing his sense of the kindness he has uniformly received. From the present first Lord of the Admiralty, and from his noble predecessor, he has had every facility and encouragement; and from the Superintendent to the humblest artisan in the various dock yards, where the Marine Glue has been introduced for use, or experiment, he has invariably received the most prompt and efficient assistance.

The best friends the discoverer of an invention can desire, are those who, being competent judges, are willing to afford him public inquiry and candid examination: and here he must be permitted to express his obligation to the Committee of Master Shipwrights, assembled at Woolwich in 1842, for the care and pains devoted to the investigation of his invention. Having no claim on their attention, except on the ground of the merits of his discovery, he is most grateful for the attention he received at their hands; and he ventures to express a confident hope that the usefulness of the Marine Glue to the Navy, will justify the favorable opinion which they were pleased to express to him, and in the Report made by them to Government.

Mr. ALFRED JEFFERY has been kindly permitted to publish the following Reports, which he has had the honor of receiving from Noblemen and Gentlemen, relative to the value and importance of the "Marine Glue."

AFFIRMATION OF LT.-GENERAL LORD BLOOMFIELD, G.C.B.
COMMANDANT OF THE GARRISON.

*Commandant's Office, Woolwich,
Nov. 6, 1842.*

"It is my duty to affirm, that in the many different experiments carried on in these marshes with the Marine Glue, in conjunction with gunpowder, and the severe tests to which it was there exposed, satisfied myself and the officers present of its perfect efficacy for every purpose proposed by the Inventor, Mr. JEFFERY; and it affords me great satisfaction to give this my testimony to the facts above-stated.

BLOOMFIELD, LT.-GENERAL,
Commandant."

FROM ADMIRAL SIR E. CODRINGTON,
COMMANDER IN CHIEF.

Portsmouth, Nov. 16, 1842.

"DEAR SIR,

I affirm most willingly that your Marine Glue is an application of the highest interest; and that the uses to which it has been applied in this Port have fully established its efficacy. I have no doubt that this discovery will cause the greatest improvements in public and private works, which principally have wood for their basis.

I am, dear Sir, yours truly,
E. CODRINGTON."

FROM SIR ISAMBARD BRUNEL, CHIEF ENGINEER OF THE
THAMES TUNNEL.

Tunnel, Nov. 18, 1842.

"DEAR SIR,

I have much pleasure in conveying to you my opinion of the Composition called Marine Glue, for joining together wood, &c. After having examined the objects submitted to the most violent tests for effecting their disjunction, as also from experiments made under my own eyes, I find that this substance is superior to anything that I have yet seen, for all the purposes to which it has been applied. And I am convinced, that its use in general constructions will be much more extended than can at present be imagined.

I am, dear Sir, yours truly,

ISAMBARD BRUNEL."

FROM CAPTAIN W. LYON.

44, Upper Grosvenor Street.

March 16, 1843.

"MY DEAR SIR,

In reply to your note, of yesterday's date, requesting to have my opinion as to the merits of the Marine Glue, I can give you the result of upwards of seven months' experiment on board my yacht, 'Circassian,' out of which time she has been five months abroad.

The caulking of the decks has in every respect answered the expectation which you had led me to expect, as there is not a leak in any one of my cabins; likewise the glass deck-lights, which have been let in with the Glue instead of white-lead, &c., are all perfectly tight. Until now, I have never been able to keep my decks tight about the partners; more especially in a Schooner, where great play is allowed to the masts; but since I have used the Marine Glue, I have no leak whatever about the masts.

Having sprung my fore-yard last spring, I determined to try the effect of the Marine Glue upon it. I glued a

long fish into the yard-arm, where the yard was sprung, and secured the ends with two small iron hoops. During the past winter I have put this yard to constant severe tests, by carrying a press of canvass on it against head seas, and find that the yard is now perfectly sea-worthy. In conclusion, I have only to add that my decks and topsides, which have been exposed to the hot sun as well as rain and frost, during the last seven months, will not require a caulking iron to go near them; and indeed, so far as I can judge, the deck will not require again to be caulked, so long as it is in the vessel. You are perfectly welcome to send any ship-builder on board my vessel, to satisfy himself as to the state of her spars and decks.

I am yours truly,
W. LYON."

FROM SIR FRANCIS AUGUSTUS COLLIER, C.B., K.C.H.,
CAPTAIN SUPERINTENDENT OF H. M. DOCK-YARD.

Woolwich, March 21, 1843.

"MY DEAR SIR,

I have received with the greatest pleasure your publication upon the Marine Glue. The Testimonials you have upon the subject ought to be perfectly satisfactory to you. I here add my humble opinion that your Marine Glue is a valuable discovery, and of the very highest importance.

I am, my dear Sir, yours truly,
FRANCIS COLLIER."

FROM CAPTAIN G. BENTINCK.

*South Street,
May 12th, 1843.*

"MY DEAR SIR,

I only found your letter on my return to England yesterday; and in answer to your inquiries,

I have great pleasure in being able to add my testimony to the merits of the Marine Glue, in every way in which I have had an opportunity of seeing it tried.

I sailed for the Mediterranean early in October, a few days after our decks were finished; and, from then up to the present time, we have been constantly at sea, and the weather generally has been unusually bad. I never found the slightest leak in any part of the decks. The Glue appeared to retain its properties in all weathers and temperatures: but what I consider the most *remarkable* proof of its efficacy, is, that our decks were perfectly tight up to the last day, about the windlass and bowsprit bitts; not a sign of a leak or drain of damp any where forward; and you are probably aware that in a large Cutter, the constant strain on the bitts in heavy weather, coupled with the heat of the galley fire, generally make the decks forward very leaky after they have been a short time at sea, whatever the scantling of the vessel may be. I have never seen an instance before of a Cutter's decks being perfectly tight forward, after being some time at sea.

I also made use of the Glue in scarfing a *top-mast* which went just above the lower-mast head. We joined it with the Glue and a couple of small iron hoops, no fish or other support; and, only wanting the Spar for a few days till I could replace it, I tried it in *every possible way*, fairly and unfairly, and the Glue remained quite unshaken.

I have great pleasure in stating these facts, and remain,

Yours truly,

G. BENTINCK."

FROM LIONEL AMES, ESQ.

21, Green Street, Grosvenor Square,

June 1, 1843.

"MY DEAR SIR,

I beg to state, in answer to your inquiries, that the Marine Glue has answered my purpose completely. I used it for caulking a long light Shooting

Punt, or Canoe; and could never before succeed in preserving a craft of this kind free from the constant annoyance of leakage, under the alternations of wet and dry to which they are liable, from not being always afloat; and I am convinced that your Marine Glue will enable me, in future, to build with probably less than one-third of the quantity of nails I have hitherto found necessary, which is of great importance, when every extra pound is of consequence.

Believe me to be,

Yours, very truly,

LIONEL AMES."

FROM COLONEL PETER HAWKER.

Dorset Place, June 3, 1843.

"DEAR SIR,

I am this moment favored with your letter. So far as a short trial of your Marine Glue will allow me to judge, I am of opinion, that it will prove to be one of the most valuable inventions that was ever offered to the public. I find it to be the only material that will effectually prevent occasional leaks in the seams of small Gunning Punts: and all the boatmen to whom I have given, for trial, some of the Marine Glue, speak of it in the highest terms.

I remain, dear Sir,

Truly yours,

PETER HAWKER."

FROM CAPTAIN CHARLES FORTNUM.

Datchet, June 16th, 1843.

"SIR,

I have built the Punt referred to in my letter of February last; and she has been joined, every plank in her, with the Marine Glue, which has answered the purpose most satisfactorily; and I have not, nor shall I fail to recommend its use to all who may be so placed as to require its application. I have to acknowledge the receipt of the

Pamphlet, which I hope will give the invention the publicity which it so deservedly merits.

I am, Sir,

Your obedient servant,

CHARLES FORTNUM."

FROM LIEUTENANT T. AKERS, R. N.

Ipswich, June 23, 1843.

"DEAR SIR,

The 'Zephyr' brig, belonging to this port, has returned from her voyage. Previous to her starting I did her over with the Marine Glue, on the larboard side from the wales to the gunwale, and also the forecastle, and am happy to say that the work stands exceedingly well. The forecastle was very leaky, and it could not be kept water tight; but where the Marine Glue was applied, it is perfectly water-tight. The owner is quite pleased with it, and I have no doubt the Marine Glue will be used by the whole of the Merchant Service.

I am, dear Sir,

Yours very truly,

THOMAS AKERS."

COPY OF A REPORT.

Woolwich Yard, July 1, 1843.

"SIR,

In obedience to your directions to survey the seams payed with Mr. JEFFERY'S Marine Glue on the quarter-deck of the 'Hebe,' and to report their state; we beg to acquaint you, that we have surveyed them accordingly, and find their state to be excellent. The Glue completely fills up the seams, and adheres firmly to them, so as to form, with the wood, a solid mass. It is so hard, notwithstanding the heat of the weather, that the point

of a knife will not make any impression on it.* It is fifteen months since this experiment was made; and we are of opinion that it has fully succeeded.

“Signed,

R. ABETHELL, } *Assistant to the
Master Shipwright.*

J. MATHEWS, }
J. COW, } *Foremen.*
J. LARGE, }
J. MONDAY, }

I fully concur in this report, having examined the seams myself.

OLIVER LANG.”

“To SIR FRANCIS AUGUSTUS COLLIER,
Captain Superintendent of H. M. Dock-Yard, Woolwich.

* This refers to the top sides, where the Glue was made a little harder than that used for the decks. “A J.”

FROM THE RIGHT HONOURABLE LORD WHARNCLIFFE,
PRESIDENT OF HER MAJESTY'S PRIVY COUNCIL.

“Wortley Hall, September 24, 1843.

“SIR,

I have received your letter of yesterdays date. Before I said anything regarding the decks of the ‘Romulus,’ I was desirous of ascertaining from my Master his opinion of the Marine Glue, with which they were payed in the beginning of this season, and I now send you his report.

So far as I am a judge, I can amply corroborate this report; and I never should think of paying the decks of any vessel of mine in any other way.

I am, Sir,

Your very humble servant,

WHARNCLIFFE.”

COPY OF REPORT.

"MY LORD,

In regard to Mr. JEFFERY'S Marine Glue, I cannot speak too highly in favor of its merits. I should recommend its use for the seams of all vessels, as far surpassing pitch, resin, or any other material made use of for that purpose, for the following reasons :—It does not stick to the feet in hot weather, nor does it crack or break in cold ; it makes the seams perfectly water-tight, when properly applied ; and being elastic, it allows for the swelling and shrinking of the wood, without letting go either side of the seam.

Such, my Lord, is my opinion of Mr. JEFFERY'S Marine Glue, as far as my experience has taught me in its use on board the 'Romulus.' She was payed with it last February, in very cold weather, which, I believe was very much against it.

I am, my Lord,

Your Lordship's most obedient

and very humble servant,

JOHN GRIGGS."

"To the Right Honourable Lord Wharncliffe."

FROM THE RIGHT HON. THE EARL OF DESART.

Desart Callan, Oct. 15, 1843.

"SIR,

I have great pleasure in stating that I payed my decks with your Marine Glue last Spring, and now find them perfectly tight. Its great advantage over the old plan of caulking is evident, especially about the bitts, where it is almost impossible to prevent the decks from leakage.

I am, Sir,

Your obedient servant,

DESART."

FROM JOSIAH PARKES, CIVIL ENGINEER TO THE ROYAL
AGRICULTURAL SOCIETY.

7, Great College Street, Westminster,

Oct. 16, 1843.

"DEAR SIR,

I have much pleasure in being able to assure you, that the expectations I had formed of the properties of your Marine Glue have been fully realized. I have employed it as an external coating to some hydraulic machinery, necessarily working in and out of water. Also, to straps exposed both to weather and water, during the space of a twelve-month. It continues unchanged in every respect, and its elasticity causes it to adapt itself to all the variations of temperature common to this climate.

I have found the friction of substances, such as wood and manufactured fabrics which have to travel through water and air at high velocities, very much diminished by a coating of the Glue, and it withstands attrition as well as leather.

In addition to its many other uses, I regard your Glue as possessing properties which cannot fail to be appreciated by engineers, as giving strength and durability to wooden structures, both under and above water; and I have found it to adhere so firmly to iron, and other metallic plates, that leaves no doubt of its proving an enduring defence against oxydation to metallic substances, whether above or under water.

I am, dear Sir, yours truly,

JOSIAH PARKES."

FROM P. M. BUGGE, CAPTAIN OF THE 'SKONNERTERNE
AFFINITAS' OF DROMMEN.

Ipswich, Oct. 18, 1843.

"SIR,

In the month of April of this year, I went to sea in my ship the 'Skonnerterne Affinitas,' and used

your Marine Glue. I find it infinitely to be preferred to pitch, which is so brittle in cold climates. The 'Skonnerterne Affinitas' was very leaky throughout, but since I have used the Marine Glue I have not had any leaks at all.

P. M. BUGGE."

FROM MR. W. S. THOMPSON, BRUSH MANUFACTURER.

Waterford, Oct. 18, 1843.

"SIR,

I have much pleasure in stating that I have used your Marine Glue for some months past, in my brush manufactory, and consider it a most valuable acquisition in my business. In brushes of fanciful shapes, it is very difficult to keep the veneers on firm, (the glue requiring to be so very tenacious;) but for this purpose I have found your Marine Glue most useful and efficacious. For brushes made for being used in water and other liquids, it is an article most desirable, and will much increase their durability. The extreme quickness with which it dries, the article glued being fit to be worked upon in five minutes, is of most essential service.

I remain, Sir,

Your's respectfully,

W. S. THOMPSON."

FROM OLIVER LANG, Esq.

Her Majesty's Dock-yard, Woolwich.

Oct. 19, 1843.

"DEAR SIR,

Your Marine Glue is, in my opinion, far superior to any other material for paying the seams in the decks of ships; and I am happy to bear testimony to its successful application in every instance in which it has come under my observation.

Your's truly,

OLIVER LANG."

FROM ADMIRAL HYDE PARKER.

Portsmouth Dock-yard, Oct. 20, 1843.

"SIR,

In answer to your letter, wishing to have my testimony as to the qualities of your Marine Glue, it appears to have answered well in the run of the Talbot, and in the seams on deck; and I make no doubt it may be used with advantage in the public service.

I am, Sir, your humble servant,

HYDE PARKER."

FROM T. R. GUPPY, Esq., ENGINEER TO THE "GREAT
WESTERN STEAM SHIP COMPANY."

White Lion Court, Cornhill, Oct. 20, 1843.

"SIR,

Upon an inspection of some of the cases in which your Patent Glue had been used, especially for filling the seams of decks, I formed a favorable opinion of its value, and tried it on a small part of the upper deck of the 'Great Britain.'

But it was impossible to allow any considerable length of time to elapse before the other part of the deck demanded a similar operation, owing to the heat of the summer. I was therefore obliged, at the expiration of a month, to decide on the course to be pursued; when the result of a minute examination was so satisfactory, that I have since caused the oakum in the seams of the whole deck to be driven down $1\frac{1}{2}$ inch, and the seams to be filled with your Patent Glue.

This having been done towards the close of the late fine weather, the elasticity of the Glue is yielding as the wood expands, and the deck is very tight.

I shall watch the result with much interest, and will, from time to time, communicate to you its state, and how far it answers the desired purpose.

I am, Sir,

Your obedient servant,

T. R. GUPPY."

FROM MESSRS. E. B. WALMSLEY AND CO.

*Phoenix Ann and Axletree Works,
Kent St. and Great Dover St., Southwark.*

October 20, 1843.

"SIR,

I have much pleasure in bearing testimony to the virtues of your Marine Glue ; it is in the manufacture of Lieutenant Irvine's patent water-tight floatable trunks, estimated as an indispensable auxiliary.

I am, Sir, your obedient servant,
(for partners and self,)

E. B. WALMSLEY."

FROM MR. CHAFFER, SURVEYOR AND BUILDER.

Burnley, Oct. 24, 1843.

"SIR,

I received your Marine Glue in December, 1842 ; I made use of it for the purpose of joining together five Yorkshire flags, $2\frac{1}{2}$ inches thick, for a water cistern of 5 feet long, 2 feet deep, and 2 feet wide. The sides and bottom were simply joined a square joint with the Glue, without any iron bolt or cramp whatever, such as are generally used for this purpose ; and in five minutes after the cistern was completed, it was filled with water, and remained so during the winter, when it was frequently a mass of ice ; and the cistern is as perfect as the day it was completed.

I have also joined several different kinds of stone with the Glue, and then tried to divide the joint, but in every instance the stone broke, without affecting the joint. The same effect was also produced with the best Leeds fire-bricks.

I am, Sir, yours respectfully,

THOMAS CHAFFER."

FROM MR. CAMPER, SHIP-BUILDER.

Gosport, Oct. 26, 1843.

"SIR,

Having adopted your Patent Marine Glue for paying the seams of the decks of several Yachts built by me, I am happy to have an opportunity of adding my testimony of its very excellent qualities: its adhesive properties are greater than anything I have ever yet known; and its elasticity, expanding and contracting as the deck becomes wet or dry, prevents the slightest leak. I have two models in my ship-yard at Gosport, of part of a deck payed with your Glue, which I have submitted to the most severe tests of wet and dry, heat and cold, for the last eighteen months, and do not find the slightest change. They are open to the inspection of any person.

I am, Sir,

Your most obedient servant,

W. CAMPER."

FROM D. BURROWS, MASTER OF THE SLOOP "ZEPHYR,"
OF IPSWICH, BELONGING TO MR. COLCHESTER.

"This is to certify, that I carried away my bowsprit in the gammon, on the 7th of August, 1843; and should have lost a week's work, unless I had fallen in company with Lieutenant Akers, of Ipswich, he being down at Felixstow; and having some of the Marine Glue with him at the time, he had the kindness to say, that if I brought the bowsprit on shore, he would endeavour to put it together with the Marine Glue, no carpenter or shipwright being near the spot at the time: it was put together in a very rude kind of manner, which is now very substantial.

Mr. Akers called on board the next day, and he found the bowsprit inclined a little, and requested me to set up the topmast stay, which he assisted me in doing. He advised me as soon as I got into the port of Harwich, to have an iron hoop put on each end of the splice, the bowsprit being

broken in the gammon, where the greatest stress is. It is now perfectly sound, and I believe that any other part would give way before the part spliced by the Patent Marine Glue.

DAVID BURROWS."

Felixtow Ferry, Oct. 30th, 1843.

FROM MR. JAMES INSOLE, OF THE FIRM OF MESSRS.
INSOLE AND JONES, COACH AND SADLERS' IRONMONGERS
AND MANUFACTURERS.

Birmingham, Oct. 31, 1843.

"DEAR SIR,

I have much pleasure in bearing testimony to the value of the Marine Glue, in the manufacture of my Patent Brushes, especially those exposed to wet or damp, or used in water.

I have made use of it for the last six months, for cementing leather and wood together, for the stocks or backs of my brushes, with great success. The Marine Glue being insoluble in water, saves the wires from corroding, protects the wood, and prevents the bristles falling out; immense advantages over other cements, for such a purpose.

At first some difficulty was found by the men in its application; but by paying strict attention to the instructions given in the mode of melting and applying, not the least difficulty has since arisen.

I am, dear Sir, your's faithfully,

JAMES INSOLE."

FROM MESSRS. LOCKE AND NESHAM, BUILDERS.

Theobald's Road, Oct. 1843.

"SIR,

We have used your Marine Glue in joining a quantity of circular timber trusses for a roof, and find that it answers the purpose remarkably well indeed.

We are, Sir, your's obediently,

LOCKE & NESHAM."

FROM CAPTAIN J. N. TAYLER, R.N., C.B.

Moorgate Street, Oct. 1843.

"DEAR SIR,

It affords me great satisfaction to inform you that we found no difficulty in the application of the Marine Glue, in building the floating breakwater at Brighton; the practical instructions which you gave the foreman when you superintended its application, were amply sufficient.

I imagined we should find, in your absence, some difficulty in gluing the planking to the timbers from its great length, being 60 feet; but not the slightest occurred. The Glue was first applied to all the timbers fore and aft; the plank was also covered with the Glue and brought to its place, when it was lifted back and the salamander introduced between the plank and timber; the Glue being thus heated, the timber and the planks were immediately screwed up, and the adhesion was perfect on the whole length of 60 feet.

Your Marine Glue possesses properties most important for ship building, and the construction of floating breakwaters; its extraordinary and quick adhesive quality appears to be one of its most valuable properties. Its being impervious to water, and unchangeable by the vicissitudes of heat and cold, renders it a powerful auxiliary for all marine purposes; and I feel confident that all the timbers being dove-tailed, and put together by the Marine Glue well screwed and treenailed, the powerful adhesion of the Glue would have superseded the use of bolts. But the buoyancy of the breakwater by the use of cork covered with your composition, allows the free use of iron bolts, and I have therefore used galvanized iron bolts in lieu of treenails.

The breakwater will be ready to be launched next tide; and I hope you will do me the favor to superintend the application of your composition so destructive to animal and

vegetable life, rendering the breakwater secure from accumulation of all such injurious adhesions, and free from the ravages of the 'Teredo Navalis.'

I am, dear Sir, yours very truly,

J. N. TAYLER."

FROM CAPT. DAVID MEIKLEREID.

On board the 'Royal Victoria,' London and Leith Steam Ship.

November, 1, 1843.

"SIR,

I have used your Marine Glue on board the 'Royal Victoria' Steam Ship, for the purpose of paying her deck-seams, and have much pleasure in conveying to you my testimony of its very excellent qualities. It has now been in the seams since the commencement of last summer, and I do not find the least alteration in its appearance; and every seam in which it has been used there has not been the slightest leakage, nor even a weep. In the hot and dry weather, when the planks contracted by the heat, I found the Glue to expand, still keeping the seam perfectly tight; and in wet weather the Glue properly yielded to the swelling of the plank. I have used it over the Boilers, where I never could, previously, keep the seams water-tight; although I have had it so hot that I could not bear my finger upon it, still the seam remained perfect, and the Glue did not stick to the feet even in that state.

I shall certainly continue to use your Marine Glue in my decks, and in every other part of the ship where I can possibly adopt it.

I remain, Sir, yours respectfully,

DAVID MEIKLEREID."

LETTRE DU VICOMTE DE CHABANNES, CAPITAINE DE
CORVETTE ET DIRECTEUR DU PORT DE CHERBOURG.

Paris, Nov. 2, 1843.

“Monsieur,

J'ai le plus grand plaisir à vous
donner mon opinion sur la Marine Glue, dont vous êtes
l'inventeur.

Ayant fait partie de la commission, chargée par le
Ministre de la Marine, de faire à Cherbourg, toutes
les expériences nécessaires pour en apprécier les avan-
tages : et ayant suivi avec attention les applications
qui en ont été faites tant en Angleterre qu'en France,
je puis en parler avec connaissance de cause. J'ai
la conviction que cette composition est d'une très
grande importance pour la Marine, par les nom-
breuses applications qu'elle peut en faire, et princi-
palement dans son emploi pour le calfatage, en
remplacement du brai, et pour enduire les carènes, en
supplément le doublage en cuivre. Mais ce n'est
pas seulement sur les latimens que l'on peut en faire
un usage utile, partout où l'on aura à faire des
collages solides, partout où l'on voudra préserver de
l'humidité ; n'importe quel corps, que ce soit, le
bois, le fer, le cuivre, la pierre, le plâtre, la toile, le
papier, &c., la Glue Marine sera toujours employée
avec le plus grand succès, et exclusivement à toutes
les autres substances, du même genre.

Au milieu de tous les nombreux témoignages satis-
faisans que vous avez reçu sur votre importante inven-
tion, mon humble opinion est d'un bien faible poids ;

mais je vous la donne, Monsieur, avec le plus grand plaisir, comme un témoignage de ma haute estime et ma parfaite considération.

Votre tout dévoué,
O de Chabannes."

TRANSLATION.

FROM VISCOUNT DE CHABANNES, DIRECTOR OF THE PORT
OF CHERBOURG.

Paris, Nov. 2, 1843.

"SIR,

I have the greatest pleasure in giving you my opinion of the Marine Glue, of which you are the Inventor.

Having been appointed one of the Commission charged by the Minister of Marine to make, at Cherbourg, all the necessary experiments, in order to test its merits; and having observed with attention, the uses to which it has been applied in England, as well as in France, I can speak with knowledge of its effects. I am convinced that this composition is of very great importance for the Navy, from the numerous applications which may be made of it—principally for supplying the place of pitch in paying seams, and for coating the bottoms in place of copper sheathings. But it is not only on ships that it may be used with advantage, but also in all cases where strong joints are required, and where wet is to be resisted: no matter on what substance, whether wood, iron, copper, stone, plaster, cloth, paper, &c., the Marine Glue may always be employed with the greatest success, and in preference to all other substances of the same kind.

Among the numerous satisfactory testimonials you have received upon your important invention, my humble opinion can have but little weight; but I give it you, Sir, with the greatest pleasure, as an acknowledgement of my high esteem, and my perfect consideration.

Your most devoted,
O DE CHABANNES."

FROM JOSEPH SOMES, ESQ.

Ratcliff, January 15, 1844.

"DEAR SIR,

Enclosed I beg to hand you my Captain's Report as to the efficacy of your Composition, or Marine Glue.

I consider from the time (nearly two years and a half) the Ship 'Maria Somes' has been out in India and China, the Composition has had a fair trial; and, on examination, I found it perfectly secure and satisfactory; and I have now much pleasure in expressing my conviction of the great utility and importance of your invention.

I am now building a Ship of 780 tons (at Messrs. Curling, Young, and Co's.) which will have teak decks, and it is my intention to apply your Marine Glue to the seams of her decks.

Any person may inspect my vessel the 'Maria Somes,' now in St. Katherine's Dock, and satisfy themselves by an examination of the same.

I remain, dear Sir, yours truly,

JOSEPH SOMES."

FROM CAPTAIN J. BAKER, TO JOSEPH SOMES ESQ.

*St. Katharine's Dock,
On Board the Ship 'Maria Somes,'
Jan. 12, 1844.*

"SIR,

The Composition which was run into the seams of the deck on board the Ship 'Maria Somes,' in September, 1841, before we left the river for China, still remains in a perfect state; no change in its appearance has taken place, and they are quite tight.

In the hottest climate the decks were quite clean in that part, whilst the pitch seams were almost in a boiling state.

Your instructions not to have the Composition touched have been attended to: in fact there was no necessity for it; I am of opinion they will last for some time longer without the least attention.

If the whole of the deck seams were payed with this Composition, I should say it would be a great saving of labour and expense, and must add to the comfort of every passenger on board, as well as a protection to the cargo.

I am, Sir,

Your most obedient Servant,

J. BAKER."

FROM T. TRENCH BERNEY, ESQ., MORTON HALL, NORWICH.

Naples, April 2, 1844.

"DEAR SIR,

As the time of my journey to England is now uncertain, I shall not delay any longer to communicate the result of my observations on the experiments I made on board my Yacht, the Meteor, since I left Yarmouth, in May last; and also to give you some hints, which I hope may be as deserving your consideration, as they may be conducive to your advantage. First, as to your Marine Glue: when properly applied, I have no hesitation in saying, it is one of the most useful inventions; but if applied (as I have been informed in many instances it has been,) for the purpose of caulking the decks of vessels where the wood is saturated with water, it is of no use; in my own case, where I used it to caulk my deck, the wood was dry, and I had all the seams well burnt out three quarters of an inch deep, by running a red hot thin plate of iron backwards and forwards, and then pouring in the Glue while the wood was hot, which I did with a cast iron cup of my own invention, also hot, which answers perfectly, and which I shall give you the plan of when we meet. The application answered so well

with the decks, that in endeavouring to tear out some of the seams to ascertain the degree of adhesion, I pulled off a strip of the deal, which separated from the plank rather than from the Glue. But the greatest advantage in the use of the Glue, is to cut off electric and galvanic action, to prevent the action of copper when laid over the bottoms of iron-fastened vessels, and thereby prevent the rusting or rapid decay of the Iron: this I have proved most satisfactorily by my rudder, which is made of wood with an iron stock or shaft passing through the body of the rudder, and which is coppered over with sheet copper in the usual manner over wood and iron: in a point where the copper came in contact with the iron shaft, considerable decay had taken place, but on taking off the copper from the body of the rudder, and raising the Marine Glue from the iron work over which it had been laid one-sixteenth of an inch thick, the iron was as smooth and as free from rust as it was the moment it was put on; and I can strongly recommend you to try the application of a thin coat of flannel, or silk, saturated with Glue over an iron bolt or any iron work under salt water, and then copper it over, and if care is taken not to drive copper or brass nails through the Glue so as to come into contact with the iron, I am certain it will remain for years unaltered, and the iron will never decay; for this purpose it is invaluable.—Next, my Yacht left England in August, and by November the bottom (though coppered) was very foul with grass and barnacles, from laying in Naples Harbour. I took her to Baia, where she was hove down with the keel quite up to the water's surface, all the copper was very bad; but below the copper on the lead keel, one foot deep, which had been coated in Yarmouth last May or June with your Glue, well impregnated with corrosive sublimate, not a blade of grass, nor a single shell fish, or the least vegetation had taken place, and the Glue was as black and smooth as when laid on. When I had satisfied myself as to the state of my rudder, I laid on some fresh hot Glue on the iron, covered it, some part with silk and some with flannel, then ironed it

down with a flat, and laid the sheet copper down again, nailed it on, and when my boat comes to England you shall see the result. I must conclude with wishing you every success, which I shall at all times be happy to promote, and with the assurance that

I am, dear Sir,

Yours truly,

T. TRENCH BERNEY."

P.S. I hope to be in London in June, and will call on you as soon as I arrive. My Yacht answers in every respect, and sails beautifully.

FROM C. C. TUPPER, ESQ.

Douglas, April 8, 1844.

"SIR,

I could not allow our treasurer to forward the enclosed remittance, without adding my testimony to the value of your Glue. I have tried it in various ways, and in all it has exceeded my utmost expectation and belief; indeed, I much regret I was not acquainted with its virtues two months earlier, as in that case it would have saved me about one hundred and fifty pounds in cash; and what is even of more importance, several tons of dead weight upon my waterwheel, in putting together a new line of rods of upwards of two hundred fathoms, by scarfing them instead of butting them with plates and bolts, in which parts I have invariably found them first to give way: however, a mining friend of mine, a Mr. W. Jones, is about attaching a line of rods to one of his mines in Shropshire, and who is equally, with myself, so well satisfied with the idea of scarfing, that he intends to adopt the method immediately. Two pieces, eight feet long, eight inches square, similar to your drawing, are now suspended at our works, with many tons attached, without the slightest

appearance of movement; and in the course of this week I intend removing it to the foundry, in Douglas, that it may be witnessed by the public generally.

I am Sir,

Your most obedient Servant,

C. C. TUPPER."

FROM CAPTAIN C. FORTNUM.

Datchet, April 8, 1844.

"DEAR SIR,

I am glad to inform you that my boat was in the water from February to November, last year, and came out as clean as if only just payed, a slight discoloration from contact with the water, but not a vestige of vegetation or green slime, as was the case with the other boats not covered with the composition.

Yours very truly,

C. FORTNUM."

FROM F. P. HAWKES, ESQ., MASTER SHIPWRIGHT, &c.

H. M. Dock Yard, Devonport,

16th October, 1843.

"DEAR SIR,

In reply to your letter of 13th inst. I am sorry to inform you, that for want of being supplied with the Glue I demanded some time since, I can add nothing to the testimony in favor of it which I had so much pleasure in giving, in conjunction, with the other members of the Committee of Master Shipwrights at Woolwich.

With every wish for your success,

I am, dear Sir,

Yours very truly,

F. P. HAWKES."

GENERAL INSTRUCTIONS FOR APPLICATION.

STRICT attention must be paid to the Melting of the Marine Glue. Break or cut the Glue into small pieces; melt it in a Pitch-pot, over a moderate fire, (Coke or Charcoal is preferable); keep it constantly stirred all the time it is melting. When the glue, No. 3, is all melted, the heat is about 212° Fah^t, but much too thick to run down into the seams; it will therefore require boiling and stirring a few minutes longer, until the heat arrives at 300° Fah^t, it then becomes in a liquid state and should be used as quickly as possible. Nos. 1 and 2 will not bear so much boiling as Nos. 3, 4, and 5. No more should be melted than is wanted to be used at one time, as frequent melting injures it. The safest way to melt it, in large quantities, is in Steam-pans; and for small quantities, by the common Glue-kettle, using Oil in the kettle instead of water, as Oil produces a greater heat, and let the Oil boil before putting the Glue into the pan.

In Paying the Seams of Ships it is used in the ordinary manner, but it is advisable to have the ladles made large, (holding about a quart,) and with covers, so as to keep the Glue as warm as possible. It is also recommended, in laying new Decks, to bevel the Planks very slightly instead of forcing open the Seams with a Caulking Iron, and to counter-sink the planks to admit the nail heads. When Oakum is used, which is always desirable, Naptha or Coal Oil should be used for dipping the Caulking Irons, as Linseed Oil prevents the Glue from adhering to the edge of the plank. In Paying Old Decks, the Seams must be well cleaned out with a rase-hook, and the Oakum hardened down, so as to leave 1 or $1\frac{1}{4}$ inch for the Glue.

In putting together a Tenon and Mortice, Boards, &c. the joints must be warmed, then apply the Glue with a stiff brush, giving an uniform thickness to each surface; afterwards expose them to a heated stove or fire, and when the Glue is in a liquid state, unite them in the usual manner by rubbing, or rather pressing them together, leaving them for a time under a pressure.

In the construction of Masts, or other large bodies, as the Glue sets very rapidly, the operation of joining should be performed in a room heated to about 120° Fah°; but should circumstances not allow of this, and the Timbers to be joined are in the open air, or in a cold situation, the Glue which has been spread on the surfaces should be again reduced to a liquid state, by means of hot irons or Charcoal braziers, held a short distance from the surfaces. The Glue being insoluble in water, has no affinity for it, therefore a perfect contact cannot be formed with wet or damp substances. Dryness of the surfaces is absolutely necessary to obtain a perfect adhesion: oil, grease, dust, and dirt must be avoided.

If Timbers become shaky in seasoning, first drive out the dirt or moisture in the shakes, and then run them full with the Glue.

When the Glue is used as a coating to prevent the admission of water or damp, or to prevent leakage in Cisterns, Tanks, or Packing Cases, &c. a glazed surface may be obtained by applying heat in the manner described for liquefying the Glue in the joining of Masts, and other large Timbers.

The Marine Glue being an elastic substance, always requires some slight fastenings, to take off the gravity of the Timbers, and prevent sliding.

To render the Marine Glue more available in its application, various degrees of hardness and elasticity are made, viz.: No. 1, the hardest, being the most adhesive—No. 5, the softest, consequently the most elastic.

- No. 1,** Is used for Paying Decks of Steamers over and about the Boilers, and for Decks and Top-sides of Ships engaged in hot climates. For sealing Bottles, Jars, &c. intended for shipment to tropical climates, and for various other purposes, where it is exposed to excessive heat.
- No. 2,** For Paying Decks and Top-Sides of Vessels engaged in all climates: (if the Seams are very narrow on Deck, or round the Stanchions, use No. 3.) For Seams in the Floors of Sugar Houses.
- No. 3,** For Paying Seams and Water-ways of Ships for temperate climates, and under water, for uniting large Timbers in general, as Masts, Yards, Spars, Beams, &c. as well as for constructions in Brick and Stone: the Seams of Barn Floors, Hospitals,

Warehouses, &c., for laying Flat Roofs to Houses
Balconies, as a substitute for Pitch Paper, used
by Paper Hangers, &c.

No. 4, For Coating the inside of Tanks, Cisterns, Water
Butts, &c., for covering surfaces to prevent the
admission of Water, for Wood Pavements, &c.,
for Leather Bands for Machinery, Brushes, to
be used between the Soles of Boots and Shoes to
prevent damp, and various purposes where not
exposed to great heat.

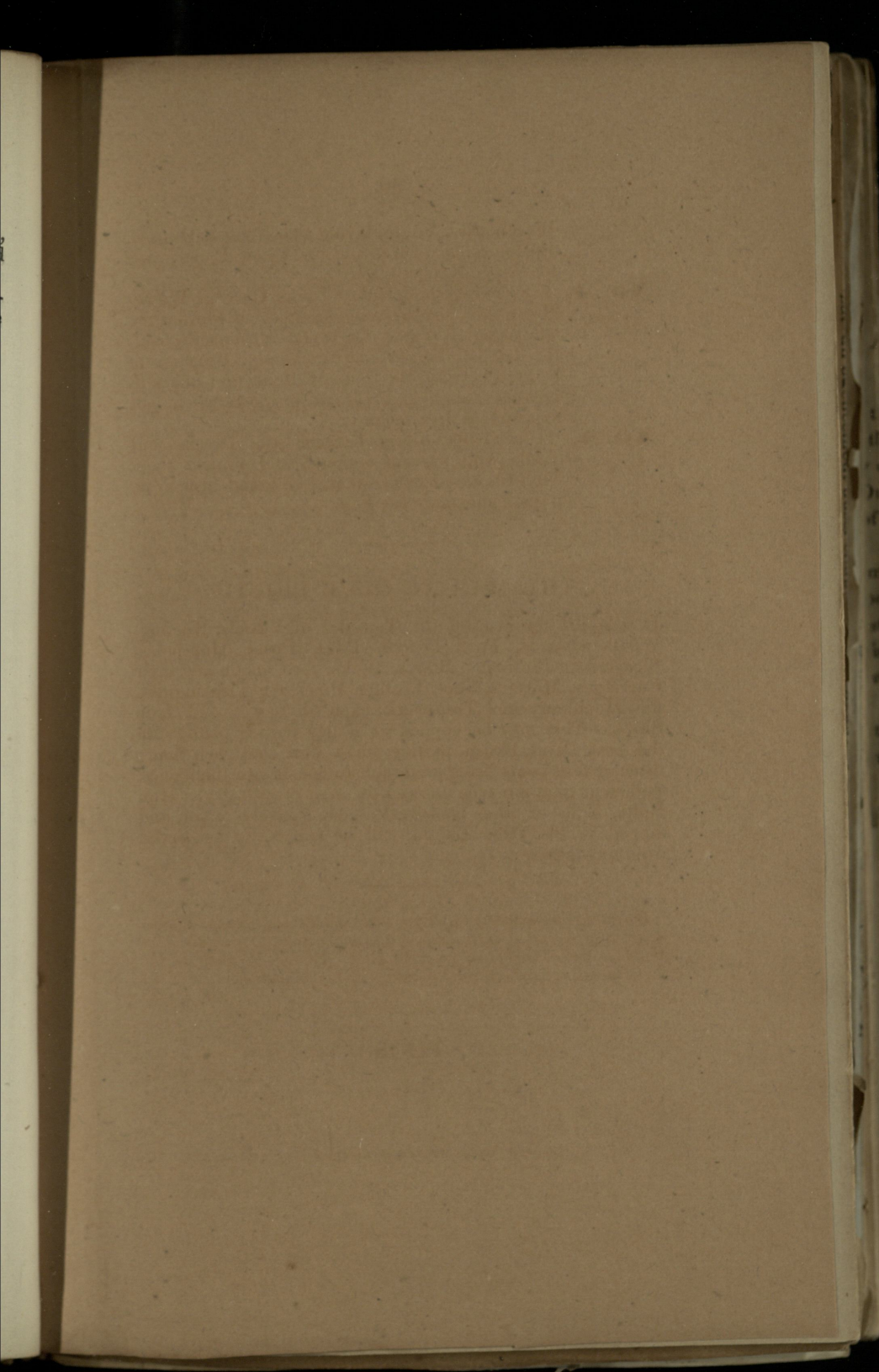
No. 5, Is used for filling between the Planks and
Timbers to prevent leakage, and protect them
from rot and decay. It will be found also to be
a good substitute for Felt.

THE MARINE GLUE LIQUID

Is adapted for coating the Topsides of Vessels, Roofing,
Weather-boards, Park Fences, Piles, Posts, Hop-poles,
Sleepers for Railroads, Buoys, Tanks, for Cannon and their
Carriages, Mortars, Shot, Leather Pipes for Fire-engines,
for Machinery and Iron-work exposed to wet, and Iron
Ships. This may be applied at nearly boiling point, with
the best Paint Brush, putting on a thin coat each time;
three or four coats being preferable to one or two thick ones.
Sufficient time must be allowed for each coat to dry. Iron
Bolts, Nails, or other Iron-work, made excessively hot, and
dipped in the Glue Liquid, will be effectually preserved
from oxydation.

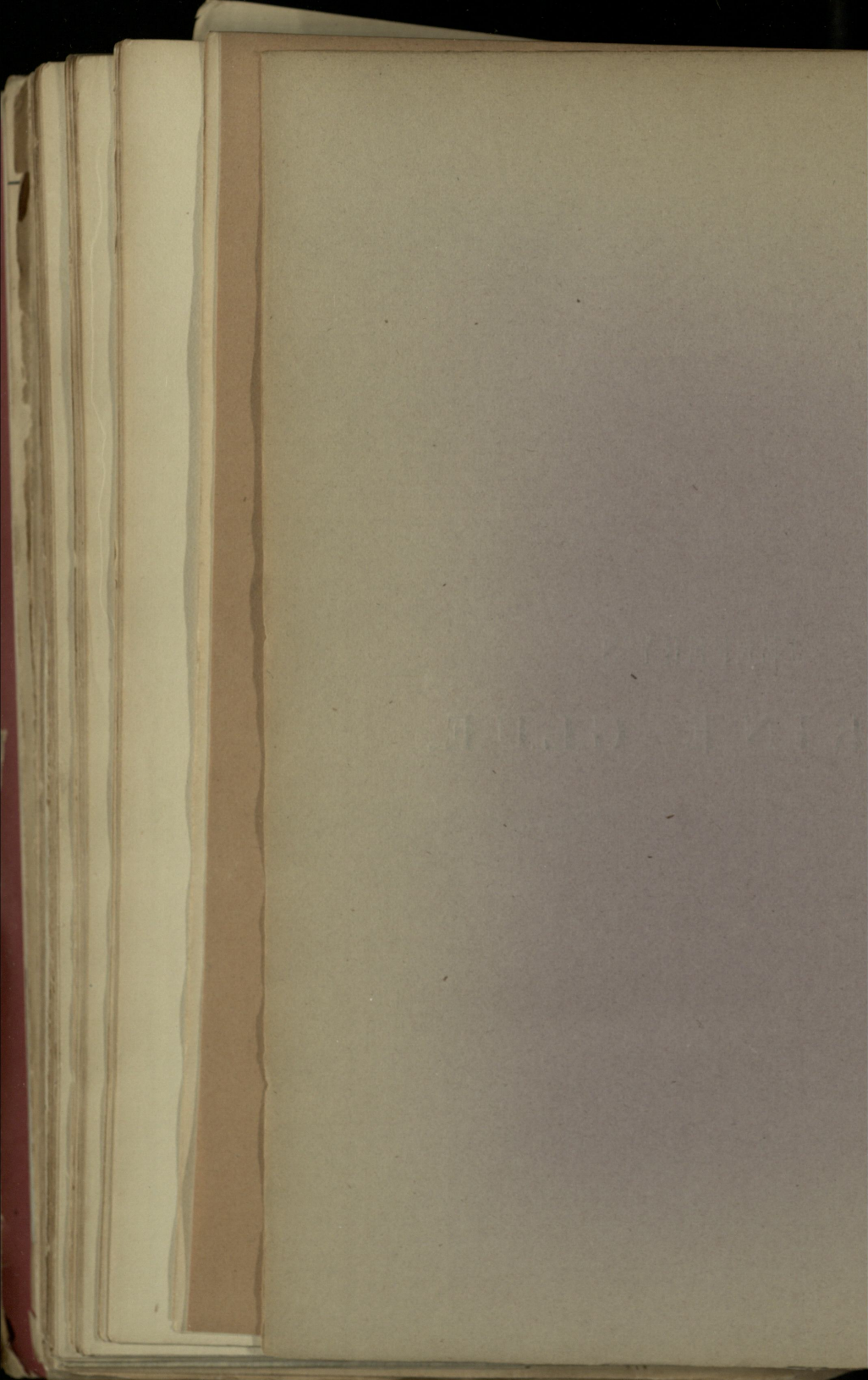
*Foremen, Shipwrights, Caulkers, other Mechanics, and the Public,
desirous of receiving instruction in the application, may obtain it on
Mondays and Thursdays, from 10 to 6. Persons residing in the
Country will receive every information upon application.*

FINIS.





JEFFERY'S
MARINE GLUE.



JEFFERY'S
MARINE GLUE.

GENERAL ADVANTAGES

IN THE

Wool Flag.

Page 1 to 12

CASE OF

MR. JEFFERY AND HIS PARTNERS

IN CONNECTION WITH

THE ROYAL NAVY.

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GOVERNMENT OFFICERS' REPORTS

ON THE

Marine Glue.

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LIMEHOUSE, JUNE, 1848.

JEFFERY'S

RAIN B. GLUE

GENERAL ADVANTAGES

ROYAL FLAG

JEFFERY AND HIS PARTNERS

ANALYTICAL REPORTS

ANALYTICAL

ANALYTICAL

JEFFERY'S MARINE GLUE.

GENERAL ADVANTAGES

TO THE

Royal Navy.

(PAGE 1 TO 8.)

CASE OF

MR. JEFFERY AND HIS PARTNERS

IN RELATION TO

THE ROYAL NAVY.

(PAGE 9 TO 15.)

GOVERNMENT OFFICERS' REPORTS

ON THE

Marine Glue.

(PAGE 16 TO 23.)

LIMEHOUSE, JUNE, 1848.

MARINE CLUB
JETTIES

GENERAL ADWATWORE

TO THE

Royal Club

(LARGE 1750)

CASE OF

MR. JENNINGS AND HIS PATENT

ON PATENT

THE ROYAL CLUB

(LARGE 1750)

GOVERNMENT OFFICERS, MEMBERS

ON THE

Marine Club

(LARGE 1750)

LIMBHOUSE, LONDON 1848

ADVANTAGES
OF
THE MARINE GLUE
IN THE
VESSELS OF THE ROYAL NAVY.

*Most of the following statements will be completely borne out by
the Official Documents annexed.*

DECKS.

THE advantages derived from the use of Marine Glue instead of pitch, in paying the decks of ships, are:—

1st. That the decks can be made perfectly water-tight, remaining so in all seasons and in all climates, the elasticity of the Glue causing the seams to remain perfectly tight, whether the boards are contracted by the extreme heat of an African summer, or expanded by wet or the extreme cold of an Iceland winter, as tested by the same vessel, in service in the most opposite and extreme climates. Capt. Sir Thomas Thompson's letter, of which an extract is annexed, is a signal illustration of the truth of these statements.

2. That the decks are freed from the very annoying inconvenience caused by the oozing of pitch under solar heat, and the seams are firm and closed in the coldest climates, where pitch is liable to become friable and to escape; and cleanliness, comfort, and security, unknown till the introduction of this Glue, are obtained to the officers and crew, whilst by these same means, and as a consequence, Ships will be much more effective and ready, in any service, even in action.

3. That by its durability it prevents the necessity of constant partial caulking, and the frequent re-caulking which is usual with pitch paying.

4. That it permits the use of iron nails in laying decks, which are a far better fastening than the usual copper metal dumps.

5. That the wear of the decks, from the use of the holy-stone for cleaning them where pitch is used, and from the repeated use of the caulking irons, is avoided, thus giving much greater durability.

6. That in steam ships especially, the decks over the boilers and machinery can be made perfectly water-tight, and this, which is of the greatest importance, has never been accomplished by any other means.

7. That the health of the Officers and Seamen is greatly promoted, by the good condition of the weather decks and the perfect dryness between decks.

8. That new decks, payed with Marine Glue, do not require to be re-payed when put in commission, as is invariably the case with all vessels whose decks are payed with pitch.

MASTS AND SPARS.

Masts are usually made of several pieces of timber, bolted together with iron or copper bolts, and hooped on as tight as it is possible to drive them; yet with the best timber employed for that purpose, they can not be prevented from receiving the wet into their joints, rotting, and often becoming unsafe in a short space of time, hence it has been found absolutely necessary to take them to pieces every four years to ascertain their actual state, when it is very frequently necessary to renew them at great cost.

The advantages derived from the use of Marine Glue in constructing masts, are:—

1. That masts made with the Glue become one solid stick of timber which no violence can separate, and are incomparably stronger than when made in the ordinary way.

2. That smaller and better timber can be used in making them.

3. That few or no bolts are required—thus avoiding the injury arising from their insertion.

4. That, if required, masts could be made much lighter, and yet possess the requisite strength for service.

5. That masts made with the Glue are preserved inter-

nally so sound that they may be used with perfect safety and confidence.

6. That masts so made afford great security in action or the worst weather.

7. That masts so made when struck with balls do not splinter near so much—preventing this great cause of death and injury to crews, while they resist many more shot before becoming disabled.

8. That masts so made would materially increase the advantages of "Advance Ships," by rendering unnecessary examination and renewing of masts when they are put in commission, as now adopted.

9. That in cases of accidents with spars, the Glue gives a prompt means of uniting them, rendering them perfectly sound and ready for use again in a few minutes, an advantage which may frequently save a ship from destruction or injury, and avoid the necessity of putting into port to repair damage.

BOTTOMS.

The advantages from using the Marine Glue in paying the seams of ships' bottoms, are:—

That the seams remain perfectly water tight, a circumstance of far more importance with respect to bottoms than even to the weather decks;—

1. Securing the safety of the cargo.

2. Avoiding the labour of pumping, which has ordinarily to be resorted to as the only means against leakage at sea.

3. Escaping the necessity of loss of time and of constantly recurring expense, by going into port for re-caulking in bad cases of leakage.

4. And the use of the Glue with canvass, instead of pitch and felt, would make a far more secure and durable bed for the copper sheathing, and a perfect protection against the worm.

TIMBERS.

The timbers which compose a ship, from the keelson to the maintop, are subjected to constant strains from wind, waves, and other causes, from the time the ship is launched until she is broken up. A substance, therefore, like the Marine Glue which unites, perfect insolubility in water; imperviousness to water—preventing leakage; elasticity to contract and expand according to the strain on the timber, or the vicissitudes of heat and cold; sufficient solidity to fill up the joints and keep them strong; and adhesive power so great that a joint made with it is rendered with more difficulty than the fibres of the wood itself, must be of incalculable advantage in the construction of almost every part of a vessel, both as to her strength and her durability. Such a substance too will fill up the cracks in shaky timber, making it one solid mass—in every respect as strong as if no rend had ever existed in it.

SAFETY FROM FIRE.

One of the advantages of the Marine Glue is its non-liability to boil over in melting, thus rendering the vessels and the property in the Dock Yards free from the danger of the Pitch-house, which often takes fire at great risk of destruction to property.

ECONOMY.

If the use of the Marine Glue in the Navy were extended according to the recommendations of the Master Shipwrights of the different Public Dock Yards, and according to reports of Naval Officers on trials of the Glue, an enormous saving would thereby be effected in the cost of maintaining the Navy in a state of efficiency, as will be seen by the following calculations, which, if thoroughly investigated, will be found to be greatly within bounds. They have been made from the best sources accessible, and from observations made during the last six years, since the Glue

has been in use in the Dock Yards, with a scrupulous regard to truth, as well as with a strong desire to state the saving which could be effected by the use of the Glue, below rather than above the actual amount.

Of the 678 vessels put down in the Navy List, there are 435 which may be considered indisputably effective, and may be therefore fairly taken as the basis of the calculation.

It will be found that 12,000 feet of seams would be the average of the decks in the Royal Navy, and that the cost of keeping a weather deck of that size well caulked in the old way with pitch, for a period of ten years, would be on an average of services £200. To keep a weather deck of the same size, for the same period, in a far more perfect state, by the use of Marine Glue, would cost £78. This gives a saving of £122 for the period of ten years, or £12 4s. per annum, for each of the 435 vessels, making a saving for the whole Navy of £5,307 a year.

It will be found that the weather decks of the vessels of the Navy cost £350 each, on an average, making the entire cost of the weather decks of the Navy, £152,250; and that they last, payed in the old way with pitch, about 12 years, thus giving a yearly cost of £12,687, whereas, payed with Marine Glue, weather decks would last at least one-third longer, or 16 years, thus reducing the yearly cost to £9,515, which makes a saving of £3,172 a year.

By the old way of pitch paying weather decks, copper metal nails were used, which cost for an average deck £120; they are however worth two-thirds their cost for old metal when the deck is broken up, which leaves £40 for copper metal nails. By the use of the Marine Glue iron nails which are now used, cost £31, being worth for old iron when the deck is broken up, about one-fifth their cost, which leaves £25 for iron nails—or £15 less cost for iron than for copper metal nails, which gives a gross saving for the weather decks of the whole Navy of £6,525, which sum divided by 16 years, as the period a deck will last makes a

yearly saving of £407; but to this is to be added £1,044, the interest, at 3 per cent upon £34,800, which the copper nails would be worth as old copper metal, a sum not required to be expended in future with glue and iron nails, making together a saving in nails of £1,451 a year.

The made masts, bowsprits, yards, and cross jacks in the whole Navy, cost, for the 12 vessels of 120 guns, £22,400; for the 7 vessels of 110 guns, £12,200; for the 17 2nd rate, class A vessels, £30,300; for the 26 2nd rate, class B vessels, £45,300; for the 32 3rd rates, £37,400; for the 37 4th rates, £23,800; for the 52 5th rates, £25,400; for the 35 6th rates, £15,500, making a total cost of £212,300. The life of made masts, bowsprits, yards, and cross jacks, when made in the old way, may be taken at about 8 years, which would give as their yearly cost, £26,537; but made with the Marine Glue they would last certainly double as long, or 16 years, which would give as their yearly cost, £13,268, making a saving of £13,268 a year.

The 19 first-rate vessels carry 2,210 guns—the 43 second-rates, 3,758 guns—the 32 third-rates, 2,348 guns—the 37 fourth-rates, 1,870 guns—the 52 fifth rates, 2,100 guns—the 35 sixth-rates, 826 guns—77 sloops, 956 guns—16 brigs, 78 guns—13 steam frigates, 221 guns—making 324 vessels with 14,367 guns.

Now the entire cost of these ships may be put down at £1000 per gun, which makes . . . £14,367,000.

Besides these Ships there are

7 Steam Sloops which may be estimated as			
	having cost	£18,000 each	126,000
32	Ditto,	£15,000	480,000
9	Steam Vessels,	£10,000	90,000
39	Ditto,	£5,000	195,000
24	Mail Packets,	£3,000	72,000

In all 435 Vessels, with a total cost of . . . £15,330,000

Total amount brought forward £15,330,000

Deduct three-tenths, or 30 per cent. to cover
the cost of guns, gun carriages, weather
decks, made masts, &c.,—

Of the 435 vessels taken as the basis of
this calculation, there are, independent of the
24 mail packets, 411 vessels carrying 14,762
guns with an aggregate weight of 662,856
cwt., which at the price, in 1840, of £1 6s.
per cwt., cost £861,712;—14,762 gun car-
riages which, at £12 6s. 6d. each, cost
£181,941;—6 brass guns of 23 cwt. each,
which at £9 per cwt., cost £1,242;—and 150
pivots, which at £58 each, cost £8,700;—

Making a total cost for guns, gun
carriages, &c., £1,053,595

The total cost of weather decks,
before stated, 152,250

The total cost of made masts and
spars, before stated, 209,700

Leaving for all other masts and
spars, rigging, &c., a sum great-
ly over the cost, 3,183,455

£4,599,000

There will remain £10,731,000
as the cost of the hulls and lower decks, or vessels properly so
called.

Now the life of a vessel cannot be taken on an average
at more than 30 years, which would give £357,700 as the
yearly cost of the hulls and lower decks of the British Navy.
But if the Marine Glue were used for all the purposes for
which it has been shewn to be eminently fitted, and so re-
commended by the Master Shipwrights, the life of a vessel
would be increased at the very least two years, which would
reduce to £335,344, the yearly cost of the hulls of the Navy,
making thereby a saving of £22,356 a year.

Mr. WARD made a statement in the House of Commons, on the 9th May last, to shew the difference in the cost of repairs in favour of Ships built in the Royal Dock Yards, when compared with Ships built by contract; by which it appears that the "Petrel" and the "Penguin," Royal Dock Yard Ships, had originally cost together £16,605, and that in eight years there had been spent for their repairs £2,854. The cost of repairing these two vessels accrues on the first eight years of their life, the period when they would require least repair. Accepting this however as the average rate of repairs in the Navy, it would give for repairs for the whole life of a Ship 60 per cent. on her original cost.

This would make the whole cost of the repairs of the Navy in thirty years £9,198,000 or the yearly cost £306,600. Now, if the Marine Glue were used wherever it is fitted to be used in the construction of the vessels of the Navy, it assuredly cannot be questioned that it would save upon so much of the cost of repairs as accrues on the vessel properly so called, at least £5,000 a year.

There would then be a yearly saving—

In caulking decks	£5,307
In the life of decks	3,172
In use of iron nails	1,451
In masts	13,268
In life of hulls	22,356
In repairs of hulls and lower decks	5,000

£50,554

Since the publication of the first edition of this Pamphlet, a statement has been made shewing that in the first construction of masts, spars, bowsprits, &c., from smaller and less costly timber, (and which has been proved to be 60 to 90 per cent stronger,) a further saving will be effected of . . .

£10,000

Total yearly saving at least

£60,000

CASE OF

MR. JEFFERY AND HIS PARTNERS,

IN RELATION TO THE

ROYAL NAVY.

A COURSE of experiments on copper sheathing led Mr. Jeffery to the discovery of this invaluable material, calculated in a very eminent degree for important purposes in ship building.

He immediately resolved to offer his discovery, which he called MARINE GLUE, to the Admiralty, for the benefit of the Royal Navy; hoping, while he did a public good, thereby to secure for himself a proper reward for his invention.

In 1841, in a communication with the EARL OF MINTO, at that time First Lord of the Admiralty, he did so offer his invention, and proposed to attend himself in the Royal Dock Yards for one or two years to give the necessary instructions for the proper manufacture and application of the Glue, and if it proved advantageous to the public service, to accept

Mr. JEFFERY continued to visit the Royal Dock Yards and personally to superintend the preparation and application of the Glue.

In the following October, considering that the Glue had been adopted by the Admiralty, he applied for compensation, which, from the time and money they had expended in the matter, they greatly needed. To this application the EARL OF AUCKLAND wrote in answer on the 3rd of November, 1846, that the merits of the Invention would be considered by the Board.

Another application for compensation not having been attended with success, Captain PECHELE on the 12th April, 1847, in the House of Commons, asked Mr. WARD, the Secretary of the Admiralty, what were the intentions of the Board, with respect to the Marine Glue, finishing his question in these words :—

“ For the last 100 years no improvement had taken place in the materials used in caulking; he therefore trusted that the honorable Secretary to the Admiralty would tell the House what course was to be adopted with reference to the material and also whether the gentleman who invented it was to be rewarded.”

To which Mr. WARD replied “ that the Marine Glue, to which the honorable and gallant gentleman had alluded, had proved to be exceedingly satisfactory in its application. He had seen experiments that day where the invention had been applied to vessels which had been exposed to the warmest climates, and the result was extremely successful. The Inventor was unquestionably entitled to compensation; and he hoped that at some future day, the House would take the question of remuneration into favorable consideration.”

Mr. Jeffery again applied for remuneration, on two grounds, that of the great advantages of the Invention to the Navy, and that of the expense, time, and anxiety it had cost him to overcome the difficulties which arose to its

adoption, claiming the sum of £30,000; an amount, leaving out of consideration the many advantages which are independent of economy, less than would be saved in one single year, if the Glue were applied to the different purposes in the Navy, to which it is most eminently fitted. In answer to this application Mr. Jeffery was told that he would be paid in proportion to the consumption of the Glue in the Royal Dock Yards, and for any further remuneration that he must depend upon his patent.

He then applied for a Royalty equal to a sum of £30,000 and was answered that the Board of Admiralty had no intention to ask Parliament for a grant.

Mr. Jeffery again applied for remuneration, and offered to receive £3,000 down, and a Royalty of £3,000 a year for four years, for a licence for the use of his Invention for the weather decks alone of the Ships of the Navy, on condition that the Admiralty would order all the recommendations of the Master Shipwrights to be carried out under his superintendence, and that at the expiration of three or four years his further remuneration should be considered. At this period the Admiralty had adopted the Glue only for weather decks.

But in the month of October last, the *Curagoa* returned from a Foreign service of four years, and the Officers of the Sheerness Dock Yard made the following Report to the Admiralty, on the Marine Glue in her main-mast, which was made 12 months previous to her being put in commission.

SHEERNESS DOCK YARD, *Nov. 2, 1847.*

“SIR,

With reference to your Memo of the 29th ultimo, to open and examine the main mast of the ‘*Curagoa*’ constructed with Jeffery’s Marine Glue, and to report upon the same,—

We beg to state, that we have endeavoured to separate, in the usual way, the component parts of the body of this mast, but could not do so without destroying it, as the fibres of the Timber itself separated, generally, more readily than the surfaces united by the Glue.

We have therefore cut the mast across in several places in order to ascertain its internal state, and we have found in every section the joints quite perfect, and the mast itself quite dry and sound internally, notwithstanding that it is externally decayed in several places where wet has lodged.

It is worthy of notice, that the bolts have been very generally omitted in this mast, and that in consequence of the perfect union of the parts which has been produced by the means of the Glue, they do not appear to have been required. Only a very slight movement of the mast appears to have taken place at one part, immediately under the cap.

We are, Sir,

Your most obedient Servants,

I. WATTS, *Master Shipwright,*
Assistant absent on Duty.

TO CAPTAIN D. PRICE,
Superintendent.

Nov. 2, 1848.

Submitted to my Lords Commissioners of the Admiralty, in obedience to their commands of the 27th ultimo.

(Signed) D. PRICE,
Captain Superintendent.

Mr. Jeffery once more applied for the full amount of the remuneration he had so frequently claimed. He was answered that the use of his Glue had been sanctioned in the Navy, and that recent experiments would extend its application.

To a further application by Mr. Jeffery, for compensation, the Admiralty answered that he overrated the value of his Glue—that there was great utility in it for weather decks—that it promised to be useful in the joining of timbers—and that if successful in its application to masts, the consumption would be greatly increased, and Mr. Jeffery would receive his reward in proportion.

Mr. Jeffery, in consequence of the opinion of the Admiralty that he had overrated the value of his invention, requested the appointment of a Committee to investigate the matter, and to take into consideration the remuneration he was fairly entitled to. In answer to this request, he was informed that the Glue was undergoing a more particular trial.

He again asked for a committee, which was declined, and he was informed that the utility of the Glue was still under trial—that the Admiralty would pay him in proportion to the consumption of the Glue, and that the Board would give facilities for the further use of it.

Mr. Jeffery once more applied on the 11th April last, to the Admiralty to grant him a committee, and if this were declined, then to grant an interview upon the subject. To this last application he has received no reply.

Mr. Jeffery and his Partners consider that from the great durability of the Glue, any profit on the manufacture of the quantity required in the Royal Dock Yards, would yield a very paltry sum towards a fair and just compensation for the invention, and for the years of labour and expense necessary to overcome the old habits, the rooted prejudices against all bold improvement, and the hindrance upon hindrance thence arising to its adoption for the Navy. They consider also that, if the use of the Glue cost the country £50,000 a year more than the inferior articles displaced by its use, instead of saving at the very least that sum, they would deserve to have their claim allowed; and they cannot help thinking that it would be a wise policy in Government to pay an encouraging or at least a fair and just compensation for an invention which is of such incalculable advantage to the Navy, and which has been proved against such manifold obstacles.

And there is one very material fact in their case which they think entitles them to a careful and thorough investigation of their claim on the part of the Admiralty. Inventors who offer their inventions to Government usually as a first step stipulate for a remuneration, and whether this be granted or not, when the Government at all entertains the invention, considerable sums of money are allowed to cover the expenses of the experiments. Now in their case they have taken a wholly different course, they have at their own cost and by their own exertions, perfected the invention, overcome all difficulties to its beneficial application in the Navy, and then asked for a fair remuneration.

GOVERNMENT OFFICERS' REPORTS

ON THE

MARINE GLUE.

WOOLWICH YARD,

11th January, 1842.

SIR,

Agreeably with the directions contained in SIR J. BARROW's letter of the 7th inst. to take into consideration the subject of MR. JEFFERY's new Composition for paying the seams of ships, we have tried several experiments, both with it and Pitch, by bringing them under different degrees of temperature, from which we find that the latter, when heated to 120 degrees, was found to run considerably; while no perceptible difference was manifested by the Marine Glue. The same superiority was maintained by the latter, when subjected to a temperature below the freezing point, and its elasticity increases very much its value in resisting the admission of water when a swelling or shrinking of the wood takes place. This we consider would add materially to its advantages on the topsides of ships, which are frequently too much disfigured by the Pitch running from the seams in hot weather. We therefore recommend, as the best means of fully testing its advantages, that in addition to the experiments now making at Portsmouth, it be tried on the Monkey Steam Vessel at this port, by applying it to the seams on the Decks, as nearly as possible to the boilers, using Pitch on the opposite side; and that a few seams may likewise be payed on the quarter-deck and forecastle, as well as the short stuff between the Ports on some new Ship. And we further recommend that the oakum, prepared by Mr. Jeffery with the same substance, be used in caulking the seams under experiment.

(Signed) { O. LANG
J. FINCHAM
F. HAWKES
R. BLAKE
J. ATKINS

To Capt. Superintendent, Sir F. A. COLLIER, C.B., K.C.H.

WOOLWICH YARD, March 4th, 1842.

SIR,

With reference to the directions contained in Sir Barrow's letter of the 7th of January last, to take into consideration the subject of Mr. JEFFERY's Composition for paying seams of ships, and to our former Report of the 11th January, stating that we had tried several experiments from which we were induced to recommend that it be tried on the Monkey steam vessel, by applying it to seams of the deck, as near as possible to the boilers, &c. We now beg to report that we have since witnessed various other experiments, from which *we have become fully convinced, not only of its advantages in paying seams, but of its invaluable properties for other purposes.*

As a Glue its tenacity has been proved by the wood giving way before the joint; being impervious to wet, it is well adapted for the purposes of covering the heads of nails, which pitch never effectually did (and which has always been a great desideratum) and thereby saving the expense of copper nails; and from its strongly adhesive and elastic nature we have reason to believe it would prove of great benefit in joints of MASTS, TIMBER, and all paying surfaces, in all SHAKES in TIMBER and PLANK, for the joints of BULKHEADS, and various other purposes; where, should it meet our expectations, we consider it will prove one of the most important discoveries for ship building purposes of modern times.

(Signed) {
O. LANG
J. FINCHAM
F. HAWKES
R. BLAKE
J. ATKINS

To Capt. Superintendent, Sir F. A. COLLIER, C.B., K.C.H.

AFFIRMATION OF LT. GENERAL LORD BLOOMFIELD, G. C. B.
COMMANDANT OF THE GARRISON.

Commandant's Office, Woolwich,

Nov. 6, 1842.

"It is my duty to affirm, that in the many different experiments carried on in these marshes with the Marine Glue, in conjunction with gunpowder, and the severe tests to which it was there exposed, satisfied myself and the Officers present of its perfect efficacy for every purpose proposed by the Inventor, Mr. JEFFERY, and it affords me great satisfaction to give this my testimony to the facts above-stated."

BLOOMFIELD."

FROM ADMIRAL SIR E. CODRINGTON, COMMANDER IN CHIEF.
Portsmouth, Nov. 16, 1842.

"Dear Sir,

I affirm most willingly that your Marine Glue is an application of the highest interest; and that the uses to which it has been applied in this Port have fully established its efficacy. I have no doubt that this discovery will cause the greatest improvements in public and private works, which principally have wood for their basis.

I am, dear Sir, yours truly,

E. CODRINGTON."

FROM SIR FRANCIS AUGUSTUS COLLIER, C. B., K. C. H., CAPTAIN
 SUPERINTENDENT OF H. M. DOCK YARD.

Woolwich, March 21, 1843.

"DEAR SIR,

I have received with the greatest pleasure your publication on the Marine Glue. The Testimonials you have upon the subject ought to be perfectly satisfactory to you. I here add my humble opinion that your Marine Glue is a valuable discovery, and of the very highest importance.

I am, dear Sir, yours truly,

FRANCIS COLLIER."

FROM ADMIRAL SUPERINTENDENT HYDE PARKER.

Portsmouth Dock-yard, Oct. 20, 1843.

"Sir,

In answer to your letter, wishing to have my testimony as to the qualities of your Marine Glue, it appears to have answered well in the run of the Talbot and in the seams on deck; and I make no doubt it may be used with advantage in the public service.

I am, Sir, your humble servant,

HYDE PARKER."

FROM OLIVER LANG, ESQ., MASTER SHIPWRIGHT.

H. M. Dock-yard, Woolwich, Oct. 19, 1843.

"DEAR SIR,

Your Marine Glue is, in my opinion, far superior to any other material for paying the seams in the decks of ships; and I am happy to bear testimony to its successful application in every instance in which it has come under my observation.

Yours truly,

OLIVER LANG."

FROM F. P. HAWKES, ESQ., MASTER SHIPWRIGHT.

H. M. Dock Yard, Devonport, October, 16th. 1843.

"DEAR SIR,

In reply to your letter of 13th inst. I am sorry to inform you, that for want of being supplied with the Glue I demanded some time since, I can add nothing to the testimony in favor of it, which I had so much pleasure in giving, in conjunction with the other members of the Committee of Master Shipwrights at Woolwich. With every wish for your success,

I am, dear Sir, Yours very truly,

F. P. HAWKES."

Woolwich Yard, July 1st. 1843.

"SIR,

In obedience to your directions to survey the seams payed with MR. JEFFERY'S Marine Glue on the quarter-deck of the 'Hebe,' and to report their state; we beg to acquaint you, that we have surveyed them accordingly, and find their state to be excellent. The Glue completely fills up the seams, and adheres firmly to them, so as to form, with the wood, a solid mass. It is so hard, notwithstanding the heat of the weather, that the point of a knife will not make any impression on it.* It is fifteen months since this experiment was made, and we are of opinion that it has fully succeeded.

	R. ABETHELL,	{ <i>Assistant to the</i>
	J. MATHEWS,	{ <i>Master Shipwright.</i>
(Signed)	J. COW,	{ <i>Foremen.</i>
	J. LARGE,	
	J. MONDAY,	

I fully concur in this report, having examined theseams myself.

OLIVER LANG."

"TO SIR FRANCIS AUGUSTUS COLLIER,

Captain Superintendent."

* This refers to the top sides, where the Glue was made a little harder than that used for the Decks.

ADMIRALTY, JAN. 28, 1846.

"SIR,

I am commanded by my Lords Commissioners of the Admiralty, to acquaint you that they have caused that part of the deck of the 'Hebe,' which was payed with Marine Glue, to

be examined, and I am to acquaint you that it is reported to be in a perfectly good state, there being no perceptible difference it since it was first payed in 1842.

I am, Sir,

Your most obedient Servant,

W. A. B. HAMILTON.

MR. A. JEFFERY.

Note.—May, 1848—The part referred to, still remains perfect, whilst the other parts have been payed with Pitch several times.

TO ADMIRAL SIR CHARLES OGLE, BART.,
COMMANDER IN CHIEF.

H. M. S. PENELOPE,

Portsmouth, May 18, 1846.

"SIR, 1st—In obedience to the directions contained in your order of this day's date, desiring me to report on the MARINE GLUE, I have great pleasure in acquainting you, for the information of the Lords Commissioners of the Admiralty, that after three years' experience (two of which were passed on the coast of Africa), I consider it to be admirably adapted for the purposes of a ship's deck.

2nd—The deck of this ship has never leaked since it was payed in 1843, except in a few places in the port gangway, where the MARINE GLUE was put in, in a hurry: and whereas in other steamers, the heat in the vicinity of the boilers when the steam was up, caused the pitch to melt so as to require their being caulked in that neighbourhood several times during the commission; but the Penelope has never required caulking in any part near the boilers.

3rd—It is, moreover, much cleaner than pitch, and consequently much better in hot climates. The Pitch sticks to the soles of the feet, and is carried about the deck in all directions; but the MARINE GLUE is as solid in hot weather as it is in cold, and therefore does not stick to the feet when walked upon.

4th—The only objection seems to be, that the Glue does not adhere to the nail-heads; but I believe the Patentee has remedied that defect since the Penelope was payed, by countersinking the nail-heads, and rendering them as perfect as the seams.

5th—In recommending the MARINE GLUE, I am sure I am but speaking the sentiments of COMMODORE JONES, who, had he been well enough to write himself, would have bestowed upon it a higher character than I can do.

(Signed) JOHN Mc D. SMITH,

Senior Lieutenant in charge."

ADMIRALTY, *July 28, 1846.*

"SIR,

I am directed by my Lords Commissioners of the Admiralty to transmit to you the following Abstracts of the Reports made to their Lordships on your Marine Glue.

I am, Sir,

Your most obedient Servant,

H. CORRY."

"TALBOT"—The Glue was applied to certain seams on the bottom and deck in 1842, and the Report was that it was likely to succeed in preference to pitch, and though it was exposed to great extremes of temperature, it had afforded complete protection to the oakum, and was less likely to be displaced from seams of decks by change of temperature than Pitch.

"CUMBERLAND."—The report was that the deck (payed in 1842) was quite tight and the Glue adhering perfectly.

"BLACK EAGLE."—The report was that the Glue adhered securely in all the seams of the deck, and that the deck was perfectly tight.

"PENELOPE."—The result of one and a half year's observation is, that the Glue appears admirably adapted for the purpose. The seams have been exposed to various climates and much bad weather, and no leaks have occurred. Deck was payed February, 1843.

"HEBE"—"PORCUPINE"—"FIREFLY"—The Marine Glue having been used in part of the weather deck of the Hebe in 1842, and since wholly on the Black Eagle, Porcupine, and Firefly, was pronounced an excellent material for that purpose, and far preferable to any Pitch, provided it was properly prepared so as to keep it free from air bubbles.

 HYDROGRAPHICAL OFFICE.
Admiralty, December 28th, 1846.

"SIR,

In reply to your letter of this date, desiring me to furnish a Report on the MARINE GLUE as applied to the decks of H. M. Steam Vessel, "AVON," recently under command, particular reference being had to the cleanliness of it as compared with PITCH when under a tropical sun,—

I have the honor to state, that as the AVON'S Decks were payed with Pitch as well as JEFFERY'S MARINE GLUE, during her

exploring service on the West Coast of Africa I had constant opportunities of perceiving the remarkable advantages of the MARINE GLUE, for it not only precluded leakage, but resisted the heat of the Boilers under, and the rays of a vertical sun upon it, whilst the Pitch seams were obliged to be wetted, sanded, or quickly screened by Awnings, to avert actual bubbling out of the seams, to a degree that precluded the bare-footed Seamen from coming near that part of the Deck. The shoe transferring the Pitch to all parts of the Ship—the Caulkers as often required.

On the other hand, the MARINE GLUE never oozed nor relaxed its adhesion to the sides of the seam grooves—virtues which gave strength and compactness to our higher deck between the Paddle Boxes; so essentially clean too, as to afford the desirably detached resting platform for our *Kroomen* whose naked bodies were in constant contact with it, without any inconvenience from the MARINE GLUE, although animal heat was added to a temperature of 92° of surrounding atmosphere.

(Signed,) H. M. DENHAM, CAPTAIN.

H. G. WARD, Esq., M. P.

Secretary of the Admiralty.

EXTRACT FROM CAPTAIN SIR THOMAS THOMPSON'S
LETTER,—1844.

“During all the cold weather off Cape Horn with the thermometer ten degrees below freezing point and the decks covered with snow it remains perfectly hard, but no appearance of cracking or shrinking from the wood; and during the very hot weather on the coast of Central America and at Tahiti it remained in the seams without becoming sticky, and even the quartermaster standing on it with bare feet for hours together made no impression on it, more than making it a little pliant if pressed with any thing hard.”

TO ADMIRAL SIR CHARLES ROWLEY,

Commander in Chief, Portsmouth.

Portsmouth, March, 1847.

“SIR,

I have the honor to state that the Marine Glue is in my opinion far superior to Pitch, its firm adhesive and cleanly qualities having been most decidedly proved during the five years it has been in use on board the ‘TALBOT.’

(Signed,) T. THOMPSON.”

“TO ADMIRAL SIR CHARLES OGLE,

Commander in Chief.”

EXTRACT FROM THE REPORT OF THE OFFICERS OF PORTS-
MOUTH DOCK YARD ON MR. JEFFERY'S MARINE GLUE.

"We beg to state that although it is now five years since these seams on the 'TALBOT' were payed with the Marine Glue, where not worn away with the deck itself, remains perfect, and affords a complete protection to the caulking underneath; the other parts of the deck where the caulking was payed with Pitch are stated to have been repeatedly recaulked, and the Pitch renewed, and are moreover at present leaking in many parts, whereas that payed with the Marine Glue is quite tight."

H. M. MAIL STEAM PACKET, "GARLAND,"

Chatham, 19th May, 1847.

"SIR,

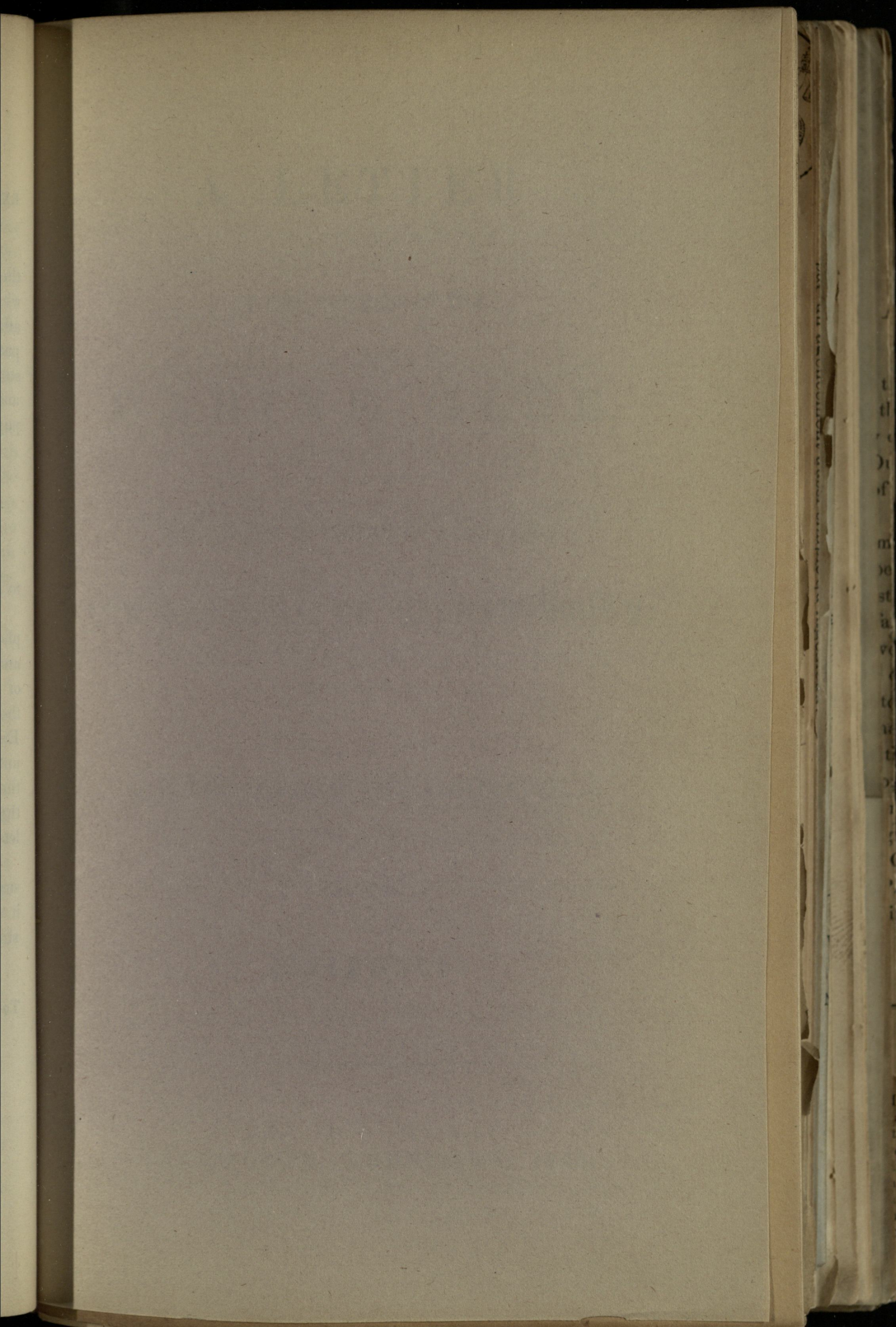
In reply to your order of the 18th inst., relative to Jeffery's Marine Glue,

"I have the honour to inform you that ever since the application of the Glue on board H. M. Steam Packet "Garland," under my command in October last, not the smallest appearance of a leak has taken place, or a seam in the deck given way, in those parts where it has been applied, viz:—over the Boilers and Engine Room; but, on the contrary, it has stood admirably under the excessive heat to which it has been exposed, as well as the severity of the cold of last winter—whilst the other parts of the deck which have been payed with pitch have been constantly leaking and out of order.

I beg also to state, that I believe the Marine Glue to be superior for the seams to any other description of Caulking; that it will stand the test of heat and cold, and add considerable strength to the parts to which it is applied.

(Signed) LUKE SMITHETT,
Master Commanding."

To H. G. WARD, Esq., M. P.,
Secretary to the Admiralty.



A LETTER

ON THE PROGRESS OF THE

MARINE GLUE,

ADDRESSED TO THE RIGHT HONORABLE

EDWARD, EARL OF ELLENBOROUGH,

G. C. B., P. C.,

FIRST LORD OF THE ADMIRALTY,

BY THE

Patentee.

LIMEHOUSE, FEBRUARY, 1846.

TO

THE RIGHT HONORABLE

EDWARD, EARL OF ELLENBOROUGH,

G.C.B., P.C.

MY LORD,

As your Lordship has accepted the high and important office of First Lord of the Admiralty, and several changes having recently taken place in the Honorable Board over which your Lordship presides, I deem it a duty I owe to your Lordship and the new members of the Board, to lay before your Lordships a brief account of the Marine Glue; and in doing so, I purpose to state the propositions I made to the Board, over which the Earl of Minto presided in 1841—the purposes for which I deemed the Marine Glue particularly applicable—the opinions entertained and the reports made by the committee of Master-shipwrights—the report and experiments made by a commission appointed by the Minister of Marine of France—the progress which has been made in Her Majesty's Dock-yards—with some remarks relative to the *economy* in its adoption.

I trust, my Lord, that you will not consider me presumptuous in drawing your attention to my invention, as I am actuated by higher motives than mere personal considerations. I am anxious to see the Marine Glue used in the Royal Dock-yards as extensively as pitch, believing that its adoption will lead to *economy*, *comfort*, and *security*, in the construction of ships. I beg to assure your Lordship that I would not engage your attention for one moment upon this subject if I were not confirmed in my opinions of its importance in naval architecture by the writings of some of the most scientific men, by ship-owners and ship-builders of the highest standing, and by a *large volume* of reports from noblemen, gentlemen, and engineers.

On perfecting the composition, which is composed of gum-lac, caoutchouc, and naptha, and which I call Marine Glue, I put myself in communication with the Earl of Minto and the Board of Admiralty, to whom I made the offer of giving the public the benefit of the invention, and to attend myself in the Royal Dock-yards for one or two years, to give necessary instructions and watch the careful application of the materials; and that if my invention proved to be advantageous in the public service, I should be satisfied to receive the reward the Admiralty might consider it merited. The Earl of Minto, after giving this proposition his consideration, saw difficulties which made such an arrangement impracticable, and recommended me therefore to send the particulars of my discovery, under seal, to the Record Office of the Admiralty, to establish the originality of the invention, and protect myself by Royal Letters Patent.

The purposes for which I considered the Marine Glue applicable in the Navy, were for the seams of vessels in lieu of pitch; for the construction of masts, spars, and joining timbers generally; for the preservation of bottoms; and, as its elasticity might be increased or diminished as circumstances might require, rendering the Glue of immense importance as a remedy to be applied to the rends and fissures of timber.

In 1842, when the Earl of Haddington, the late First Lord of the Admiralty, presided over a new Board, instructions were given to the Master-shipwrights to assemble at Woolwich and amongst other things, to report on the Marine Glue.

In consequence of these instructions to the Master-shipwrights, I was desired to attend at Woolwich for the purpose of giving such explanation and performing such experiments as might be proposed by the committee.

The committee having satisfied themselves that the Marine Glue was perfectly insoluble and unaffected by water, ordered various large pieces of timber, consisting of English oak and pine, to be joined together and then subjected to such strains as are applied for the purpose of "proving" the chain cables. In order to ascertain its properties as to its resistance and being unaffected by violent concussion, large masses of timber were joined together and precipitated from the top of the shears, (a height of 75 feet) to the granite pavement below. The result

in every case established the fact that the adhesive power of the Marine Glue was greater than the fibres of the different woods operated upon.

Drawings of the numerous experiments, shewing general dimensions and other particulars, were made and recorded in the books kept for these purposes at Woolwich.

A target, constructed with oak and pine balks of timber, was joined together with Marine Glue, and fired into with cannon shot; afterwards in its centre a shell was exploded. The result in this case, after the target was almost totally destroyed, proved that the tenacity of the Glue exceeded that of the timbers.

I must beg your Lordship to observe, that in making these experiments I wished to prove the power of the Marine Glue independently of any fastenings which are usually employed in ship-building. It is by no means intended to supersede the use of fastenings, but to give an additional strength in the construction of ships. But at the same time it may be remarked that numerous fastenings, which have a tendency to weaken the timbers of a "made mast," may be dispensed with by the use of the Marine Glue; and whilst an enormous additional power is given to the timbers, it also preserves them from internal rot and decay.

To shew the facility with which the Marine Glue might be used in cases of shipwreck or dangers at sea, and in the construction of conveyances for men and ammunition, or other stores, across rivers, when engaged in warfare, I constructed a boat, 12 feet long, 4 feet wide, and 20 inches deep, weighing 2 cwt., and folding up like a fire screen. The time occupied in unfolding this boat, fixing the hooks and eyes, applying the Glue to about 100 feet of seams, launching, rowing with four persons on board to the middle of the river off Woolwich Dock-yard, and bringing the boat again on shore, was only 35 minutes; without leaking one drop of water. This boat had two air-tight compartments; one in the fore part of 15 cubic feet, and one in the stern of $2\frac{1}{2}$ cubic feet. This boat still remains in the Woolwich Dock-yard, and may be seen by those interested in the subject.

The Committee of Master-shipwrights forwarded to the Board of Admiralty their first Report on the Marine Glue, January 11th, and their second Report, March 4th, 1842.

To these Reports, which I am informed are highly in favor of the Marine Glue, I must beg your Lordship to refer, as I have only been favored with their substance.

After these Reports to the Board of Admiralty were made, I was commanded by their Lordships to send them an estimate for making 1300 barrels (about 150 tons). Having complied with their Lordship's request, I humbly suggested the propriety of the Marine Glue being made under their Lordships' direction at the Royal Dock-yards, conceiving from my position I could not make the Glue upon such advantageous terms as might be effected in the mode proposed. Subsequently, their Lordships adopted my recommendation, and materials were forwarded to Chatham to make 12 tons, with which experiments were to be made.

I have had the honor of receiving from the Lords Commissioners of the Admiralty the following Reports, dated July 28, 1845, on the seams of decks and bottoms which have been payed with the Marine Glue.

TALBOT.

"The Glue was applied to certain seams on the bottom and deck, (in 1842), and the Report was, that it was likely to succeed in preference to pitch; and though it was exposed to great extremes of temperature, it had afforded complete protection to the oakum, and less likely to be displaced from seams of decks by change of temperature than pitch."

CUMBERLAND.

"The report was, that the deck (payed in 1842,) was quite tight, and the Glue adhering perfectly."

BLACK EAGLE.

"The Report was, that the Glue adhered securely in all the seams of the deck, and that the deck was perfectly tight."

PENELOPE.

"The result of one and a half years' observation is that the Glue appears admirably adapted for the purpose. The seams have been exposed to various climates and much bad weather, and no leaks have occurred. (Deck was payed Feb. 1843.)"

HEBE, PORCUPINE, & FIREFLY.

"The Marine Glue, having been used in part of the weather deck of the Hebe in 1842, and since wholly on the Black Eagle, Porcupine, and Firefly, it was pronounced an excellent material for that purpose, and far preferable to any pitch, provided it is properly prepared, so as to keep it free from air-bubbles."

The Marine Glue, my Lord, has also been employed in the construction of the following masts:

The main mast of the ——— * in 1842,

„ „ „ Eagle „ 1842,

„ „ „ Curaçoa „ 1842,

And the main yard of the Eagle „ 1842.

I am not aware, my Lord, that any Reports have at present been made on the mast and main yard of the Eagle, but on the made mast of the Curaçoa I have had the honor to receive the following Report:—

Admiralty, Nov. 20, 1844.

SIR,

I am commanded by my Lords Commissioners of the Admiralty to acquaint you, that by a Report dated the 30th June last, received from the Curaçoa, it appears that in the made mast of that ship, put together with your Marine Glue, the slight oozing has nearly ceased, and that after having experienced heavy seas and fresh gales, the mast, notwithstanding the twist formerly noticed, stands remarkably well and shews no signs of weakness.

I am, Sir,

Your most humble servant,

JOHN BARROW.

Other experiments were made on the bottoms of several vessels to ascertain whether it would prevent the accumulation of animal and vegetable substances. This application was not recommended by the Committee of Master-shipwrights, as they had not sufficient evidence thereon; and as the reports have proved unfavourable, I deem it prudent, for the present, to abandon the subject. But at the same time allow me to

* This mast has not at present been shipped.

acquaint your Lordship that in experiments I have since made at Toulon, from further experience, I have partially, if not entirely, succeeded in this respect.

In 1843 I received a request from the Minister of Marine of France to attend a Commission appointed to make experiments with the Marine Glue at Toulon. The following extract from their Report, dated February, 1845, bears strong testimony to the value of the Marine Glue for caulking:—

“There should also be taken into the account of the expense of the common caulking, that it often occasions a displacement of the Bulk-heads; that losses arise from the provisions being damaged, that decay is caused in the hull of the vessels from the same cause, which inconveniences are obviated by the Marine Glue caulking; and is moreover attended with this great advantage, that it protects the ship’s company from wet. The importance of the above considerations will be appreciated although their numerical value cannot be fixed. *In recapitulation, the Marine Glue caulking is superior to common caulking for rendering the seams impervious, and its greater expense, at first, in comparison with the latter, is fully compensated by its superiority and greater durability. The commission consider that it will be for the advantage of the State, to substitute the Marine Glue for Pitch.*”

I beg to forward your Lordship the original report of this commission, as well as the translation which I have published, and to draw your Lordship’s particular attention to these most important facts, viz:—

The French commission in shewing the Marine Glue Caulking, is as economical as pitch, have arrived at their conclusions by calculating upon a reduction of labour, taking wages at 1s. 3d. per day, and the value of the glue, at 70s. per cwt. It is therefore obvious, my Lord, the annual saving of expense in Her Majesty’s Dock Yards, would, by the substitution of the Marine Glue for Pitch, be enormous, as the wages paid to caulkers is from 4s. to 5s. per day, being *three or four times the amount* of French labour; and the Marine Glue can be made in Her Majesty’s Dock Yards, *for less than one half the amount* calculated upon, by the French commission.

But, my Lord, there are other considerations of much more importance in caulking seams, than the expense of either Marine Glue or Pitch.

It is found by repeatedly caulking the seams of decks, the planks in the course of time become considerably impaired, and it not unfrequently occurs from this circumstance, that either new decks are required, or it becomes necessary to re-lay the old ones. You will observe, my Lord, in either case, that if the Marine Glue dispenses with much of this caulking, not only is there a vast economy in labour, but in timber also.

My Lord, having briefly pointed out the advantage of the Marine Glue, as regards security and economy in seams I am anxious to place the matter before your Lordship in another manner. The extra expense of £100 or £200, can never be a matter of consideration, where a vessel of immense value is either to be strengthened or protected from injury and decay; and, my Lord, as regards decks, of vessels which cost from £40,000 to £80,000, the extra first cost, will not exceed from £10 to £20 the whole deck. As this Marine Glue does not liquify by solar heat in the hottest climates, it will be seen at once what additional *comfort* and *cleanliness* is given to every Officer and Seaman on board.

On the application of the Marine Glue to a Made Mast, I conceive that, all persons connected with this department, are unanimous in their opinion of its utility. I apprehend that a Mast, made in the manner I have before described, will obtain an additional strength of from 10 to 20 per cent; and farther, by obtaining this additional strength, and by the means of excluding moisture from the internal parts, more than 20 per cent is given to its durability; and whilst such important results are obtained by the use of the Marine Glue, *not one per cent* is added to the expense.

Your Lordship is aware that the timbers which compose a Ship, are exposed to constant straining from the winds, the waves, and other causes, from the time the Ship is launched, until she is broken up; the qualities therefore, in a substance used to join those timbers, must be a substance insoluble in water, or it would be useless; it must be impervious to water

so as to prevent leakage; it must be elastic, so as to contract and expand according to the strains on the timber, or the vicissitudes of heat and cold; it should be sufficiently solid, to fill up the joint and give strength; and it should be adhesive, so as to connect the timbers firmly together. That these properties are all combined in an eminent degree in the Marine Glue is proved from the experiments which have been made.

Numerous are the applications that can be made with the Marine Glue, by the practical shipwright, in the construction of a vessel. I will not, however, trouble your Lordship with any further details; but before I conclude I would briefly remark to your Lordship, that most new inventions have to encounter some prejudices in their introduction, or difficulties in the first instance, of application. In the latter respect, I have much pleasure in informing your Lordship that the experience of the last few years, has enabled me to apply the Marine Glue to seams of vessels, with even greater certainty of success. I am also enabled to join masts and other large timbers, when the Glue is in a cold state, thereby avoiding the necessity of applying heat.

I have the honor to be,

MY LORD,

Your Lordship's most obedient

and very humble servant,

ALFRED JEFFERY.

as to prevent leakage, it must be closed, so as to contract
and expand according to the change of the fluid, on the
surface of heat and cold; it should be sufficiently solid to
all up the joint and give strength, and it should be adhesive
as to connect the timbers firmly together. That these
properties are all combined in an eminent degree in the Marine
(this is proved from the experiments which have been made).

Yours are the experiments that can be made with the
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in the first instance of application. In the latter respect, I have
and pleasure in informing your Lordship that the experience of
the last few years has enabled me to apply the Marine (this
to seams of vessels with even greater certainty of success,
I am also enabled to join masts and other large timbers when
the timber is in a cold state, thereby avoiding the necessity of
splitting them.

I have the honor to be

My Lord

Your Lordship's most obedient

ALFRED JEFFERY

CONCLUDING REMARKS

IN THE

REPORT OF THE COMMISSION, APPOINTED BY THE ADMIRALTY,

"FOR THE PURPOSE OF RECEIVING SUCH EVIDENCE AS MESSRS. JEFFERY, WALSH, & Co.
MIGHT THINK NECESSARY FOR THE ELUCIDATION OF THEIR CLAIM,"

AND ALSO TO

"Report their opinion on the value of the Marine Glue for their Lordships' consideration."

"We think it right to state to their Lordships all that has occurred to us during this investigation which may be considered as constituting grounds for fair and reasonable compensation to the Claimants.

"From the evidence adduced before us, our conclusion is, that the invention is of value and importance, though it is by no means easy to fix a precise pecuniary value to it. It reflects credit on the Inventor and Patentee of the Marine Glue, that believing that his invention would prove of incalculable benefit to the Naval Service, he should at once so freely put it into the hands of the Government, even allowing the article to be manufactured, as already noticed, without making any stipulation for payment or remuneration; and we think that he is also fairly entitled to consideration for the time and money he has expended in the public service, as well as for the length of time which has elapsed between his original claim and the present enquiry.

"If, after a careful perusal of this Report, and the evidence on which it is founded, it is admitted that pecuniary saving will be effected by the general use of the Glue to Weather Decks, we think the Claimants may reasonably expect some reward commensurate with such pecuniary profit, and also consideration on the score of the additional security, cleanliness, and comfort, introduced by its use. And if more enlarged experience should prove that which it does not appear unreasonable to expect, viz.—that its use may be extended to all the Decks and Topsides of all Ships; and if longer trials be impartially made as to its applicability to Mast-making purposes, and rends and shakes in Timber, in order to ascertain whether a sound and real economy may be effected by the use of the cheaper Northern Timber in lieu of the costly material now in use—then we think the Claimants may fairly calculate that the justice, impartiality, and liberality of Her Majesty's Government, will not fail to award them an adequate compensation for the further benefits so conferred."

"We have the honour to be,

"Your obedient humble servants,

(Signed)

"FRED. WARDEN, CAPT., R.N.

"W. ROGERS."

Committee Room, Admiralty.

July 16, 1850.

I most respectfully beg to impress upon your Lordships' minds, that by this means there will be a vast annual decrease in the expenditure of the Navy, as regards the Decks : the saving in metal nails alone would form a large item.

I have the honour to be,

My Lords,

Your Lordships' most obedient and very humble servant,

(Signed) ALFRED JEFFERY.

To the Right Honourable the
Lords Commissioners of the Admiralty.

ANCIENNE MAISON AUTELLET.
8, Rue Michel-le-Comte.

LACRÈZE

SUCCESS^r

*Fabrique et Magasin d'Armes assorties,
Articles de Chasse.*

Paris

Imp. Goussier et C^{ie} Lesclapart, 44.

LAHURE'S LIFE-BOAT.

HAVRE 1844.

HAVRE, 1st June 1851

Boat, in all respects similar to the one now submitted to public inspection, was in service at Havre, from 1844 to 1846, when it was crushed by a large vessel lying at the quay.

reduction in the beam is one of the advantages of Mr Lahure's system, giving facilities in rowing to windward in heavy seas and strong currents. The Boat is nevertheless very stiff : in case of being upset, it turns immediately keel down and frees from water.

To each oar, is attached a small line, the other end of which is made fast to a ring on the stem ; so that, should the Boat upset, men could easily regain on board by seizing the oars. Each man should be provided with a floating waist-belt. The valves to the oars let the water out and what they allow to flow into the Boat is of no impor-

In April 1845, two large ships arrived in Havre roads during a trial of this Boat : the ships were both under close reef'd fore topsail ; a crew of seven men rowed three miles from the shore, in a tremendous sea. The crew reported that the Boat freed itself from the immense quantity of water shipped, without the least difficulty. This trial was witnessed in presence of most competent judges.

In the latter end of 1847, by order of the Minister, the Boat exhibited received the favour of a trial at Treport, in the presence of the Princes of the Royal Family.

An increase in the dimensions of the Boat would certainly add in the same proportion to its usefulness. Mr LAHURE suggests the length should be from 27 to 30 english feet ; then eight or ten Rowers would be required instead of six.

Although exactly similar in dimensions to the model exhibited, the Boat destroyed

in 1846 had proved adequate to a task far superior to its apparent destination, was the security of Pilots communicating with ships; for, by its means, a greater number of lives were saved in several occasions, than had been anticipated by the same expectations of even the inventor himself. Among other instances on record, the rescue of two english vessels were rescued: one, in November 1844, was the brig *Earl* captain Skipsey; the other, in August 1845, was the schooner *Hebburn Hall*, captain Pawley.

The Boat would in addition to every ordinary purpose offer the advantages of a life buoy: for if thrown into the water from any height, it will immediately turn downward, free from water and it might be suspended from what the French call *mouilleur*. It should be supplied with a suit of clothes in a water tight bag and a lighting apparatus for night.

Two or three men lying under the Boat's seats would always be a foot and a half above the water, even when the Boat was keel upwards.

In case of a vessel being cast on shore, if such a Boat as the one in question were on board, it might be thrown out with a few of the crew under the seats; so that whatever situation it met the sea, these men would still be protected in the heaviest surf and convey through it a rope to the lee shore.

This system can be applied to boats of all descriptions and sizes, provided the bottoms are not too flat: for sailing boats the valves of the scuppers must be made water tight from outside. Such valves may be done as easily as the rowing Boat's ones.

E. LAHURE.

To each boat, is attached a small line, the other end of which is made fast to a ring on the shore; so that, should the Boat upset, men could easily regain on board by seizing the ring. Each man should be provided with a floating waist-belt. The valves to the scuppers should be made water tight from outside, and what they allow to flow into the Boat is of no importance.

In April 1845, two large ships arrived in Havre loaded during a trial of this Boat: the *St. Louis* and the *St. Pierre*. Both under close reefed fore topsail; a crew of seven men rowed three miles from the shore, in a tremendous sea. The crew reported that the Boat freed itself from the water with the greatest facility, without the least difficulty. This trial was the presence of most competent judges.

In the latter end of 1847, by order of the Minister, the Boat exhibited received the favour of a trial at Treport, in the presence of the Princes of the Royal Family.

In the increase in the dimensions of the Boat would certainly add in the same proportion to its usefulness. Mr. LAHURE suggests the length should be from 27 to 30 english feet; the breadth eight or ten fathoms would be required instead of six.

NOTICE

SUR UN SYSTÈME

d'EMBARCATIONS INSUBMERSIBLES

ET NE POUVANT

NI S'EMPLIR NI RESTER CHAVIRÉES,

Système combiné et proposé à MM. les Officiers de la Marine militaire
et de la Marine du Commerce.

PAR M. E. LAHURE, DU HAVRE.

Renseignements Préliminaires.

En 1844, j'avais construit une yole de mon système et l'avais offerte à la Chambre de Commerce du Havre, qui l'avait acceptée et s'était chargée des frais d'entretien de l'embarcation, la laissant d'abord à la disposition des pilotes et lamaneurs de notre port.

Cette yole a duré plusieurs années et n'a dû sa fin qu'à un accident: un grand chaland porteur de 5 à 600 tonneaux de marchandises et sous la remorque d'un vapeur, vint, par une fausse manœuvre, se jeter sur ma yole amarrée à son poste le long d'un quai, et l'écrasa entre lui et le mur du quai,

Pendant toute sa durée, cette yole n'avait donné lieu à aucune plainte et avait rendu des services assez nombreux et très importants. Plus loin j'en citerai quelques exemples.

En 1846, deux autres yoles, semblables à la première et que m'avait commandées le brave amiral baron de Mackau, furent par moi livrées à l'administration de la Marine du Havre; mais elles n'ont jamais fait de service et, sauf pour les essais de la livraison et pour quelques expériences faites à Eu, elles sont restées dans les magasins de la Marine du Havre, où elles sont encore. A cet égard, toutefois je dois l'avouer, découragé par les événements qui, depuis quelques années, avaient assailli la France, je n'avais, jusqu'à présent, fait aucune tentative pour obtenir la cessation d'un tel état de choses.

Motifs et But du Système.

La majeure partie des pilotes du Havre montent de grands sloops pontés sur lesquels ils croisent dans la Manche et abordent les navires, le plus souvent, fort loin du

port ; mais, comme il est impossible que tous les navires soient rencontrés par ces sloops, d'autres pilotes ne montent, eux, que des yoles à clins très légères sur lesquelles ils se rendent à bord des navires qui se présentent devant le port sans pilote (1). Ces yoles sont ordinairement armées de sept hommes, six lamaneurs et un pilote, et bordent six à sept avirons. La navigation dans ces embarcations est très dangereuse, et pourtant les mers courtes et brisées de la rade du Havre ne permettent pas de les remplacer par les bateaux de sauvetage employés ailleurs. Que cet effet soit, comme je le crois, dû au peu de profondeur des mers et à la forme des plages qui entourent le Havre, ou qu'il provienne d'autres causes, il existe ; et les bateaux de sauvetage du système anglais, trop larges et trop lourds, offrent pour lutter contre la mer et le vent, qu'il faut le plus souvent dompter pour se rendre à bord des navires quand ils manquent d'un pilote, une résistance supérieure à la puissance que peuvent produire les rameurs avec leurs avirons. Cet effet a été constaté à diverses reprises et entr'autres d'une manière authentique par l'essai d'un de ces bateaux que fit en 1840 M. le capitaine de corvette de Mortemart, alors chef des mouvements du port du Havre. M. Bernay, pilote du Havre, qui était le patron dans cet essai, explique, comme je vais le répéter, l'effet que produisit sur ce grand bateau un violent coup de mer qu'il reçut à la sortie des jetées du Havre, coup de mer qui ne permit pas de pousser plus loin l'essai qui se faisait : « Le bateau ne put passer par-dessus le » sommet de la lame et resta appuyé contre, l'avant en haut l'arrière en bas, courant » ainsi de l'arrière avec le coup de mer, c'est dans cette position que furent désemparés » plusieurs avirons, dont un vint frapper violemment à la tête M. de Mortemart lui-même, » et fort heureux fut-il que le coup de mer qui avait maîtrisé le bateau l'eût ramené dans le goulet du port du Havre ! Les rameurs qui montaient ce bateau étaient cependant les meilleurs du port et au nombre de douze. On verra plus loin, par le narré d'un essai comparatif fait de ce bateau et de ma yole, quelle fut la supériorité de celle-ci pour se nager contre le vent et la mer.

Dans l'hiver de 1842 à 1843, et en très peu de temps, neuf hommes perdirent la vie en naviguant en yole sur la rade du Havre ; dans un premier événement une yole nommée l'*Eclair* avait chaviré et noyé sept hommes, tout l'équipage qui la montait ; et peu après, dans un autre événement semblable, deux lamaneurs perdaient encore la vie. Témoin de ce dernier événement, convaincu que les deux malheureux qui avaient péri, quoiqu'ils fussent bons nageurs, se seraient sauvés si la yole qu'ils montaient eût été insubmersible, je me décidai à chercher les moyens d'exécuter un projet que j'avais conçu depuis longtemps ; celui de faire une yole dans les conditions qui ont été obtenues de celles que j'ai construites.

(1) Une disposition que donnent au grément des navires nos pilotes dès qu'ils sont à bord, permet, aussitôt qu'un navire paraît à l'horizon, de reconnaître s'il est ou s'il n'est pas muni d'un pilote.

Description des Embarcations de mon Système.

Elles sont en tôle et munies de compartiments remplis d'air atmosphérique et inaccessibles à l'eau. Un de ces compartiments occupe tout le fond du bateau, c'est-à-dire toute la partie de la carène qui se trouve au-dessous, non-seulement de la flottaison, mais d'un plan restant encore, quand l'embarcation est armée et montée de son équipage, à sept ou huit centimètres au-dessus de la surface de l'eau. Ce compartiment est subdivisé en six ou huit caisses entièrement séparées l'une de l'autre, afin que si l'une venait à contracter des fuites et à se remplir, cette circonstance ne produisit aucun inconvénient grave.

Deux autres compartiments occupent en longueur tout ce que l'espace réclamé pour les rameurs et le timonnier permet de prendre sur l'avant et sur l'arrière de la yole, et en hauteur toute celle de l'embarcation.

Des ouvertures, *trous d'homme* disposés et se fermant comme ceux des chaudières à vapeur, permettent d'entrer dans toutes les caisses à air et de les entretenir de peinture à l'intérieur comme à l'extérieur, et d'y faire aussi toutes les réparations que peuvent rendre nécessaires ou des avaries ou toutes autres causes.

Au moyen du premier compartiment, l'eau ne peut séjourner dans le bateau qui est muni de dalots à soupapes permettant la sortie et s'opposant à l'entrée de l'eau : au moyen des deux autres, il se replacerait immédiatement qu'elle en bas s'il advenait, quoique ce soit à peu près impossible, qu'il vînt à chavirer. Enfin les bancs sont disposés de telle manière que ni le pied ni la jambe d'aucun rameur ne passent sous un banc.

Les yoles que j'ai construites jusqu'à présent sont de la dimension la plus petite que je puisse atteindre à cause de la réduction de l'épaisseur des tôles ; elles ont de longueur, 8 mètres ; de largeur, 1 mètre 50 centimètres ; de profondeur, au maître-couple, 81 centimètres ; elles pèsent de 670 à 680 kilogrammes.

Description de l'Armement.

Sur chacun des avirons dont l'embarcation doit s'armer, il est frappé solidement à l'extérieur et tout près du portage, un petit cordage de 5 à 6 centimètres de circonférence et de 4 à 7 mètres de longueur. Ces cordages ainsi attachés par une de leurs extrémités chacun sur un aviron immédiatement au-dessous de la dame ou du tollet, passent tous à l'extérieur du bateau et sont, par l'autre extrémité, attachés à un anneau qui se trouve à l'avant et au-dessus de l'étrave de la yole. De chaque côté de la yole sont des cordes doubles et formant une espèce d'étrier pour y remonter.

Il y a dissidence entre les marins et entre les pilotes que j'ai consultés sur cette question : les cordages ainsi frappés sur les avirons et toutes les autres précautions prises contre le cas où la yole viendrait à être chavirée, sont-elles utiles ? les uns prétendent qu'une yole, à l'aviron, sans avoir d'abord été remplie d'eau, au moins en partie par un premier coup de mer, ne chavire jamais : or la mienne ne peut se remplir puisque le peu

d'eau qui y entre en ressort de suite, et ceux-là trouvent inutiles les lignes destinées à transformer d'abord les avirons en bouées de sauvetage ; et ensuite à donner les moyens de ramener ces agrès à bord dès que l'équipage y serait remonté. Mais ceux qui prétendent qu'une yole, même sans avoir été remplie en partie par des coups de mer précédents, peut être chavirée par la force d'une seule lame, réclament l'emploi de ces cordages. On ne doit donc pas les supprimer, même dans des yoles destinées à naviguer à l'aviron : car ils ne peuvent nuire, s'ils sont superflus.

Par la même raison il est bon de n'admettre, comme je l'ai toujours proposé, pour monter mes yoles, que des hommes munis de ces ceintures insubmersibles, aujourd'hui très répandues, et nageurs autant que possible.

Emploi des Yoles.

Mettant les choses au pire, et admettant que la yole fût renversée, sur sept hommes qui la montaient, il s'en trouvera toujours bien quatre ou cinq, qui, s'étant au moment de l'événement, cramponnés à leur aviron regagneront immédiatement la yole à l'aide de la ligne attenante à cet aviron ; et ceux-là remontés dans la yole revenue immédiatement quille en bas et bastante, devraient infailliblement réussir ou à rapprocher l'embarcation de ceux de leurs camarades qui auraient laissé aller leurs avirons, ou à donner les moyens de la regagner à ceux-ci que les ceintures de sauvetage maintiendraient toujours à flot. Mais, dût aucun des hommes de la yole n'être resté saisi de son aviron, ces agrès formeront une drôme qui maintiendra la yole debout à la mer et permettra à ceux qui la montaient de l'accoster facilement et de remonter à bord. Ma yole rend donc impossibles des désastres comme celui-là surtout qui eut lieu quand la yole *l'Eclair*, en chavirant en 1843, coûta la vie à la fois à sept hommes dont plusieurs étaient excellents nageurs, événement après lequel le bateau fut retrouvé, chaviré, mais sans avaries.

Si l'opinion de ceux qui prétendent qu'une yole à la rame ne peut chavirer sans avoir été d'abord remplie d'eau, au moins en partie, est fondée, il n'y a aucune recommandation à adresser à des marins qui monteront mes yoles ; mais si on veut expérimenter les moyens de salut qu'elles présenteraient encore, quand même surviendrait un coup de mer assez fort pour les renverser, ce qui exige qu'on les chavire, il convient de faire bien observer à ceux qui feront cette manœuvre : 1° qu'on doit attendre avant que personne remonte à bord de la yole que le plat-bord submergé revienne à fleur d'eau ce qui a lieu à peu près instantanément : en moins de dix secondes ; 2° qu'aussitôt ce plat-bord à fleur d'eau, un seul homme doit s'élancer dans le bateau et passer de suite au bord le plus élevé. Les six autres doivent, eux, se saisir du plat-bord avec les mains et se soutenir dessus, mais ne pas essayer à remonter dans le bateau avant qu'il soit à peu près vide, ce qui aura lieu en moins de quarante secondes. Dès qu'il sera vide tous remonteront à

bord, observant seulement de ne le faire qu'en deux escouades chacune de deux ou trois hommes.

S'il advenait qu'un des hommes eût de la peine à remonter, il faudrait éviter que plus de deux hommes vinssent l'aider. Il est bien entendu que ces deux hommes seraient de ceux du bord duquel leur compagnon chercherait à remonter.

Dans les essais pour chavirer ma yole le poids des sept hommes d'un même bord ne suffirait pas, il faut ouvrir les dalots du bord qu'on immerge et laisser entrer l'eau dans ce côté de la yole.

Présenter ces observations à des marins est tout-à-fait superflu. Cependant j'ai dû le faire ; car, lorsqu'on voit chavirer l'embarcation qui vous porte, on n'est pas toujours maître de soi-même ; ainsi, la première fois que j'ai été chavirer une de mes embarcations seule et loin de terre, en naviguant à la voile (1), un des hommes de mon équipage, quoique bon nageur, marin expérimenté et prévenu de ce qui allait se faire, perdit complètement la tête et faillit se créer un danger là où il n'en n'existait réellement aucun.

(1) Cette embarcation n'avait été construite que pour naviguer à l'aviron ; mais, sur la demande de M. Mazeras, pilote du Havre, homme plein de mérite, et qui avait apprécié, lui, les avantages qu'offrent mes yoles pour la conservation de la vie de ceux qui les montent, j'y avais adapté un gréement et une voile avec lesquels elle donnait d'excellents résultats. Le but de cet intelligent pilote était d'empêcher que l'obligation d'avoir, à bord, toujours les avirons sur les bras, n'éloignât ses collègues et les lamaneurs de faire habituellement usage de la yole ; il pensait, et l'auteur du système partage cette opinion, qu'il fallait habituer à cette embarcation ceux destinés à la monter, et que, pour atteindre ce résultat, il fallait les encourager à s'en servir de tous les temps. Ce but avait été parfaitement atteint ; mais tout ce qui avait été fait pour l'obtenir devint bientôt inutile : Défense ayant été faite par la chambre de commerce, aux pilotes et lamaneurs, de se servir de la yole quand l'emploi n'en serait pas exigé par des circonstances graves, et les réclamations que j'adressai contre cette décision à M. le président de cette chambre, étant restées sans succès.

Toutefois pour des yoles destinées à naviguer à la voile, il est indispensable d'adopter pour les soupapes fermant les dalots un système qui les rende étanches de l'extérieur à l'intérieur ; ce système je l'ai créé et si je ne l'ai pas appliqué aux deux yoles que m'a fait faire l'amiral baron de Mackau, c'est qu'il m'avait été expressément imposé de les faire en tout semblables à celle qui avait existé plusieurs années, et que mes demandes d'être autorisé à introduire, dans la construction de ces yoles, quelques améliorations que j'avais proposé d'y faire sans augmentation de prix, avaient été rejetées, ce qui prouve, au reste, combien devaient avoir été favorables les rapports qu'avait reçus ce ministre sur l'emploi de cette embarcation. Pour ne naviguer qu'à l'aviron, il suffit de clapets qui empêchent seulement l'eau d'entrer en grand, mais sans être étanches, et avec de tels clapets il n'entrait jamais dans la yole qui a été employée et qui a été à la mer dans les plus mauvais temps, plus de quelques litres d'eau au-dessus de sa plate-forme du fond.

Cette circonstance seule commande donc de présenter les instructions qui précèdent, quelque superflues qu'elles soient pour des marins.

Mes yoles seraient surtout d'excellentes bouées de sauvetage, puisqu'elles peuvent être jetées à l'eau d'une grande hauteur et que, quelle que soit la position dans laquelle elles y tombent, elles se placent instantanément la quille en bas et se vident en moins d'une minute sans aucun secours étranger. Pour employer une telle yole comme bouée de sauvetage, il suffira donc de la suspendre à l'arrière des navires, soit au couronnement, soit dans les haubans d'artimon, à un de ces appareils dits mouilleurs ; car alors au cri : *Un homme à la mer !* le seul mousse lui-même pourrait faire tomber à côté de cet homme une embarcation prête à le recevoir pour peu qu'il sût nager, ou à recevoir les nageurs du bord qui, sachant combien peu ils auraient à risquer eu le faisant, ne pourraient hésiter à se jeter à bord de la yole pour se porter au secours de leur camarade. Ma yole dans une telle circonstance serait un secours d'autant plus précieux qu'elle pourrait contenir pour la nuit un flambeau qu'allumerait le choc produit par la chute et des vêtements secs qui, dans les saisons rigoureuses, empêcheraient les malheureux remontés dans cette embarcation de périr de froid avant que le navire eût pu venir les rejoindre, comme il n'arrive que trop souvent avec les bouées de sauvetage. Si l'état de la mer était tel qu'il fût nécessaire de tenir la yole debout à la lame, ce résultat serait facilement obtenu par les seuls avirons frappés sur les lignes, seulement ces avirons devraient ne pas être saisis dans le bateau, puisqu'il faudrait qu'ils s'en séparassent dans la chute qu'ils feraient avec celui-ci. Pour que les avirons non saisis ne fussent pas susceptibles de riper par suite des roulis et tangages du navire auquel le bateau serait suspendu, il suffirait de quatre taquets en bois d'une douzaine de centimètres de hauteur fixés deux de chaque bord sur deux bancs dans la partie sur laquelle le rameur ne s'assied pas et assez en abord pour ne laisser entre le bord du bateau et ces taquets que la place nécessaire pour contenir trois avirons.

Enfin un navire eût-il échoué sur la plus mauvaise côte, fût-il séparé du rivage par les plus terribles brisants, s'il avait, au nombre de ses embarcations de bord, une de mes yoles, elle irait seule, grâce à son insubmersibilité et poussée par la seule puissance du vent, porter à terre la ligne si précieuse, si indispensable pour pouvoir établir entre le rivage et le navire un va-et-vient qui permettrait de sauver le monde.

Ma yole donne encore un résultat qui doit être signalé : trois ou quatre hommes couchés sous les bancs n'éprouvent aucune gêne ni quand on la chavire ni quand on la maintient la quille en haut : dans cette position l'air se renouvelle par les dalots du fond. Ces hommes ne seraient pas même mouillés dans le mouvement de rotation complet, si l'eau, que la yole renvoie sur sa plate-forme, du fond en se retournant quille en bas ne les atteignait un peu ; cette quantité d'eau, qui est d'ailleurs assez réduite, s'échappe de suite par les ouvertures à soupapes. Ce résultat offrirait peut-être, dans des cas très graves, et par exemple dans celui indiqué au paragraphe précédent, un précieux moyen de

salut, si le rivage était désert. C'est à messieurs les marins à apprécier toute la portée d'un tel résultat.

Il me reste maintenant à recommander qu'avant de se servir, pour la première fois, d'une de mes embarcations, on en fasse ouvrir les caisses et que toutes étant bien vides, on vérifie le tirant d'eau de la yole; puis qu'on le marque ostensiblement à l'arrière et à l'avant, parce que, cela fait, si plus tard une fuite venait à se déclarer, on le reconnaîtrait immédiatement chaque fois qu'on mettrait la yole à l'eau, ce qu'il est bon et bien facile de faire de temps en temps. Au reste ces cas de voie d'eau sont peu probables puisque pendant trois années qu'a fonctionné une de mes yoles, elle est toujours restée étanche. S'étancher par le seul effet de l'oxidation est d'ailleurs un effet qui se produit toujours dans les bateaux en tôle; mais le moyen de vérification que je propose est trop facile pour qu'on hésite à l'employer.

Je dois prévenir toutefois que, dans les caisses fermées de la yole qui, avant d'être écrasée, avait fonctionné au Havre pendant trois années avec plein succès, et à laquelle bon nombre de marins et notamment deux équipages entiers ont dû leur salut (1), je n'ai jamais pu éviter la présence de quelques litres d'eau. D'abord je crus à des fuites; mais il n'en existait pas et j'ai dû attribuer à la condensation de l'humidité en suspension dans l'air atmosphérique quand on ferme les caisses, l'introduction de l'eau qu'elles contenaient et dont la quantité, toujours restée à peu près stationnaire, n'a jamais présenté le moindre inconvénient, quoique pendant des quinze et dix-huit mois les compartiments fussent restés fermés et la yole toujours à flot.

(1) Ce résultat est d'autant plus remarquable qu'il faut observer que cette yole était trop petite pour mériter le nom de bateau de sauvetage; elle n'avait été destinée qu'à porter sept ou huit hommes et à permettre, ainsi que je l'ai dit au commencement, aux pilotes de se rendre à bord des navires sans exposer leur vie.

EXPÉRIENCES

SUBIES

Par la Yole de la Chambre de Commerce du Havre

ET

SAUVETAGES

Opérés au moyen de cette Embarcation.

RAPPORT de la Commission chargée de constater les Expériences faites sur le Canot en fer d'après les plans de M. E. LAHURE, négociant.

Havre, le 18 septembre 1844.

M. Lahure ayant proposé de construire, au prix de 1,800 francs, une embarcation en fer susceptible de faire, dans de très mauvais temps, le service du lamanage, des souscriptions particulières, auxquelles s'est joint le département de la Marine, se sont organisées et ont bientôt permis de donner suite à ses propositions. Dès lors, et sur la demande expresse de M. Lahure, s'est formée une commission chargée de fixer les conditions que devait remplir une embarcation destinée à un semblable service. Cette commission s'est trouvée composée de MM.

GACHOT, lieutenant de vaisseau, directeur du port ;
BERTELOOT, capitaine de port ;
GUÉRIN, capitaine au long-cours ;
EDOU, capitaine au long-cours ;
DOULLÉ, lieutenant de vaisseau en retraite, pilote-major ;
MAZERAS (Philippe), pilote la station du Havre ;
DORIVAL (Jules), aspirant pilote de la station du Havre ;
LECESNE (Thomas), lamaneur de la station du Havre ;
NOEL (Joseph), lamaneur de la station du Havre.

La commission ainsi constituée s'est réunie en séance et a arrêté les conditions sui-

En marge est écrit :

Dimensions de la yole,

Longueur totale, 8 mètres 40 centimètres.

Largeur..... 4 — 50 —

Bordé au M C. " — "

vantes auxquelles devait satisfaire, pour être admise, l'embarcation proposée par M. Lahure :

1° Placée dans l'eau, la quille en haut, l'embarcation devra revenir la quille en bas, et se trouver vide et bastante dans l'espace d'une minute ;

2° Les caisses à air destinées à maintenir le canot flottant et quille en bas, devront être divisées en trois compartiments tels, qu'en cas d'accident, il reste toujours deux portions de caisse capables de faire flotter l'embarcation ;

3° L'élévation des bancs au-dessus de la plate-forme, formant le fond du canot, pourra être réduite jusqu'à vingt centimètres ; mais M. Lahure devra faire en sorte qu'elle soit de vingt-cinq centimètres ;

4° Les formes du canot ne pourront être plus pleines que celles du plan et du modèle en relief présentés aux membres de la commission ;

5° Les soupapes pour la sortie de l'eau et l'opposition à son entrée, devront toutes fonctionner sans l'emploi d'aucun ressort ;

6° Il ne devra être employé aucune tôle d'une épaisseur inférieure à un millimètre.

Plusieurs difficultés indépendantes de la volonté de M. Lahure ont retardé la construction du canot en fer projeté, et c'est seulement le 20 août 1844, que la commission a été mise en demeure de se prononcer sur les qualités que possède cette embarcation destinée à lutter contre le mauvais temps.

Le 22 août, la commission s'est donc réunie à bord du cutter le *Rôdeur*, que M. le commandant Petit, avait mis à sa disposition, et là elle a constaté les résultats suivants :

« Placée la quille en haut, l'embarcation de M. Lahure se retourne instantanément et revient la quille en bas. Ce mouvement de rotation ne se ralentit que du moment où le plat-bord du côté immergé arrive au niveau de l'eau, parce qu'il se trouve alors subordonné au temps que l'eau met à passer à travers les soupapes, temps dont la durée a été reconnue d'environ quarante secondes.

» L'embarcation est très-stable : deux hommes debout sur le même plat-bord la font peu incliner. »

Toutes les autres conditions renfermées dans le devis se trouvant fidèlement remplies, M. Lahure était en droit de faire la remise définitive de cette embarcation, et cependant, sur le simple désir manifesté par quelques membres de la commission, il a bien voulu promettre d'ajouter deux nouvelles soupapes pour accélérer encore la sortie de l'eau ; il a donc été décidé que la commission se réunirait encore une fois dès que ce travail additionnel serait exécuté.

Le lundi, 16 septembre 1844, l'établissement des deux nouvelles soupapes étant terminé, la commission s'est réunie sur le quai de la place François 1^{er}, et là, elle a fait procéder à de nouvelles expériences qui ont confirmé les résultats précédemment obtenus. Elle a reconnu, de plus, que neuf hommes, placés sur le quai, avaient beaucoup de peine à chavirer cette embarcation, en tirant sur deux cordages passés sous la quille

et fixés au plat-bord du large : elle a aussi constaté que la quantité d'eau qui entraît par les soupapes dans une mer houleuse était tout-à-fait insignifiante, et elle a jugé que la marche de cette embarcation était comparable à celle des canots ordinaires de lamanage.

En résumé, la commission est d'avis que le canot en fer construit d'après les plans de M. Lahure, présente toutes les conditions de sécurité que l'on peut exiger d'un embarcation destinée à naviguer dans une mer agitée ; elle pense donc que ce canot doit être mis à la disposition des pilotes qui y trouveront une garantie contre les nombreux dangers auxquels les expose le service journalier qu'ils sont appelés à remplir.

La commission ne croit pas pouvoir mieux terminer ce rapport qu'en adressant à M. Lahure des éloges sur la manière dont il s'est acquitté d'une tâche qu'il avait entreprise dans des vues philanthropiques et complètement désintéressées : elle a pu apprécier la longueur du travail et des calculs auxquels cet honorable négociant a dû se livrer pour arriver à un pareil résultat, bien digne de fixer l'attention de toutes les personnes qui s'intéressent au perfectionnement des constructions navales.

Havre, le 18 septembre 1844.

Signé : J.-J. - EDOU, BERTELOOT, A. GACHOT, THOMAS,
LECESNE, GUÉRIN, D.-S. DOULLÉ, NOEL,
MAZERAS et DORIVAL.

La Chambre de commerce du Havre à M. Lahure

Havre le 2 novembre 1844.

MONSIEUR,

Nous avons vu avec beaucoup d'intérêt les détails contenus dans la lettre que vous avez fait à notre président l'honneur de lui écrire le 24 septembre dernier, concernant la yole insubmersible à la construction de laquelle vous avez donné des soins si désintéressés et si heureusement dirigés. Ceux d'entre nous que nous avons particulièrement chargés de s'entendre avec vous pour les légères dépenses pour lesquelles vous vous étiez vu forcé de réclamer notre concours, nous ont rendu le compte le plus satisfaisant de cette embarcation, et, notamment, de l'épreuve à laquelle elle venait d'être soumise par des pilotes qui s'étaient portés au secours de la goëlette anglaise *Gypsy*. Nous n'aurions certainement pas hésité à concourir, par quelques dépenses au succès de l'entreprise philanthropique que vous aviez déjà amenée si près de son entier complément : mais depuis lors une lettre qui nous a été adressée par MM. les membres de la commission chargée des expériences pour reconnaître les qualités de votre yole, place particulièrement cette embarcation sous notre protection et notre direction. Nous acceptons avec empressement cette offre généreuse. Nous donnerons tous nos soins à la bonne conservation de cet utile moyen de secours, et des instructions seront données pour que, dans toutes les occasions

son emploi soit dirigé de manière à répondre, le plus complètement possible, aux intentions philanthropiques qui vous ont animé dans cette circonstance.

Nous avons l'honneur d'être, etc.

Le président de la chambre de commerce.

Signé : M^r DELAROCHE.

Narré, adressé à M. le président et à Messieurs les membres de la chambre de commerce du Havre, d'un essai comparatif de trois bateaux insubmersibles appartenant à cette chambre, essai fait en présence de M. le baron de la Gatinerie, commissaire-général de la marine au Havre, et d'une réunion nombreuse de capitaines et de pilotes.

De ces trois embarcations, la première était le grand bateau de construction anglaise expérimenté déjà plusieurs années auparavant par M. le capitaine de corvette de Mortemart et dont il a été fait mention dans ce qui précède; la seconde, un canot de sauvetage à peu près du même système et de la même forme, mais beaucoup moins grand que la première embarcation construite à Cherbourg sur un plan anglais; et la troisième, la yole en tôle du système Lahure construite dans le but de préserver les pilotes et lamaneurs du Havre des dangers auxquels ils s'exposent quand ils vont, avec mauvais temps aborder les navires qui se présentent en vue de terre sans pilote, excursions qui se font toujours dans les yoles à clin et jamais dans les bateaux de sauvetage, qu'il est impossible de nager contre le vent et la mer.

*A Monsieur le président et MM. les membres de la chambre de Commerce
du Havre.*

Havre 16 Avril 1845.

MESSIEURS,

Hier 17 avril, entre trois et quatre heures de l'après-midi, le vent qui avait été O.-N.-O. le matin venait de passer au N.-N.-E.; il ventait en tempête: deux navires américains qui doublèrent la Hève pendant que se faisait l'essai dont je vais vous rendre compte ne portaient aucune autre voile que le petit hunier au bas ris et la mer était si grosse que l'avant et l'arrière de ces navires, de 5 à 600 tonneaux chacun, se trouvaient alternativement élevés ou abaissés à des hauteurs telles que de la jetée, à l'œil nu, on en voyait parfaitement tous les mouvements quoiqu'ils fussent alors à plus d'une lieue de terre.

C'était à ce moment que devait se faire entre vos trois embarcations de sauvetage l'essai comparatif que vous aviez autorisé. Le canot de sauvetage construit à Cherbourg, sorti un peu avant les deux autres qu'il devait attendre, aperçut par le travers de la pointe des Neiges, point tout-à-fait à l'abri du vent et de la mer, un chasse-marée qu'il crut en détresse et se dirigea vers ce navire, abandonnant ainsi l'essai; un instant après,

vers quatre heures du soir, les deux autres embarcations sortaient ensemble ; le grand bateau de construction anglaise monté de treize hommes, et la yole en tôle, de sept seulement.

Dès la sortie du port, la yole prit les devants sur le grand bateau, elle tenait le cap au N.-O., tandis que celui-ci gouvernait presque au nord ; mais quoiqu'il tint ce cap, la violence du vent le faisait dériver tant et si bien que sa route valait à peine le O.-N.-O. Enfin tout ce qu'il put faire, fut d'aller jusqu'à la première bouée de la rade, après quoi il remit le cap sur la jetée, renonçant à aller s'essayer dans la mer tout-à-fait grosse à l'ouvert de la Hève. Malgré ses nombreux rameurs, ce bateau ne pouvait gagner contre le vent et la mer quelque peu grosse qu'elle fût dans les parages où il se trouvait, et après trois quarts d'heure d'efforts inutiles, il se décida à mâter et à appareiller pour revenir au port, mais il ne l'atteignit pas et alla en Seine dans la belle mer.

Pendant ce temps la yole continuait seule sa route vers la grande bouée en dehors de la Hève, et malgré toutes les assertions des pilotes présents qui soutenaient qu'aucune embarcation à la rame quelle qu'elle fût ne pourrait jamais affronter la violence du vent et de la mer qu'elle rencontrerait à l'ouvert de la Hève, cette embarcation atteignait et doublait les grandes bouées et à six heures dix minutes elle était de retour au port, son équipage déclarant qu'il était satisfait de sa marche et surtout de ses mouvements, son tangage étant très doux et sa stabilité tout-à-fait satisfaisante. A l'égard de la marche, M. Mazeras son patron a déclaré qu'il doute fort qu'on eût pu faire faire aux meilleures yoles en bois le parcours qu'il venait d'exécuter avec la yole en tôle.

Au moment où M. Mazeras entrait au Havre, le grand bateau dans le sud de la jetée et tout-à-fait à l'abri de la mer, reprenait les rames pour nager debout au vent, et ce ne fut qu'à sept heures et demie qu'il put regagner le port, quoique le point le plus éloigné qu'il eût pu atteindre ne soit qu'environ au tiers de la distance qu'avait parcourue la yole en tôle. S'il a donné de pareils résultats sans avoir eu à lutter contre une mer bien grosse, qu'eût fait ce bateau dans celle que la yole en tôle a supportée sans le moindre inconvénient.

Ce nouvel essai qui confirme les résultats constatés par M. le capitaine de corvette de Mortemart plusieurs années auparavant, lors d'un essai dans lequel cet officier distingué avait reconnu que ce grand bateau de sauvetage, très bon peut-être pour d'autres emplois, ne pouvait être d'aucune utilité toutes les fois qu'il faudrait faire route contre le vent et la lame, complète, Messieurs, tous les essais qu'on pouvait demander pour ma yole.

Déjà, vous le savez, la première question : reviendrait-elle bien qu'elle en bas et vide, dans le cas où le malheur voudrait que malgré sa grande stabilité, elle se trouvât chavirée par la violence d'un coup de mer, avait été constatée à suffire par des essais itératifs, et pour la seconde, les formes en sont-elles convenables pour le service auquel elle est des-

tinée, elle se trouve, je crois pouvoir l'avancer sans crainte d'être contredit, complètement résolue par l'expérience faite hier.

J'ai l'honneur d'être, Messieurs, votre très humble serviteur.

E. LAHURE.

A Monsieur le Président et à Messieurs les Membres de la Chambre de Commerce du Havre.

Havre, 14 Mai 1845.

MESSEURS,

Je dois vous rendre compte de deux expériences nouvelles auxquelles a été soumise la yole en tôle que j'ai construite : la première volontaire, la seconde toute fortuite.

La première était un essai à la voile : M. Mazeras considère comme indispensable de mettre la yole en état de naviguer ainsi (1), et il avait désiré que quand il ferait cet essai je vinsse à bord de la yole avec lui, afin de bien examiner le résultat que donneraient les soupapes, qui n'ont été disposées que pour la navigation à l'aviron (1).

M. Mazeras, deux lamaneurs et votre serviteur montaient l'embarcation. Ce ne fut qu'après m'être bien informé si tous mes compagnons étaient bons nageurs que je fis route. Nous appareillâmes tribord au vent sous une voile ordinaire de pirogue, voile de lougre amurant sur le bord. Il ventait une jolie brise et M. Mazeras me fit observer à plusieurs reprises combien les tangages étaient doux, ce qui offre un grand avantage même pour la marche, l'élan du bateau ne se perdant pas à la rencontre de chaque lame. Il me déclara aussi à plusieurs reprises, qu'il était très satisfait de la vitesse à la voile.

Il ne ventait pas assez pour faire incliner beaucoup la yole par la seule pression du vent sur la voile, et pour éprouver ce qui aurait eu lieu si tel avait été le cas, nous nous placâmes tous les quatre sous le vent, ce qui d'abord ne la faisait que peu incliner, mais nous restâmes dans cette position jusqu'à ce quelle fût remplie par l'eau qui s'introduisait petit à petit à travers les joints des soupapes devenues submergées par la charge de la voile et par le poids de tout l'équipage placé sous le vent. Quand l'eau eut rempli notre yole autant qu'elle peut la remplir, et qu'ainsi nous eûmes amené le plat-bord sous le vent à environ 12 centimètres au-dessous du niveau de l'eau, nous lofâmes et repassâmes au vent, ce qui, en un instant, redressa et vida la yole. Ensuite nous revirâmes vent devant et primes babord amures. Après avoir couru environ une demi-lieue sous la même amure, nous avions dépassé l'ouest de la jetée et nous nous trouvions à environ une demi-lieue dans le nord-ouest de ce point : Là, nous recommençâmes l'essai que nous avions fait sur l'autre bord, mais cette fois lorsque nous eûmes amené le plat-bord bien au-dessous de

(1) Voir la note de la page 5.

la surface de l'eau, nous voulûmes voir ce qui en résulterait si, au lieu de lofer, nous mettions le vent dans la voile; nous mîmes donc la barre au vent, ce qui fit coucher la yole tant et si bien que les avirons, l'ancre, le cablot et tout ce qui était à bord vint tomber sous le vent où était déjà tout l'équipage; nous voulûmes filer l'écoute, mais elle était tournée; la drisse fut larguée, mais par la mauvaise confection du rocambot, la voile ne put amener: l'embarcation chavira donc complètement, le mât et la voile passant vivement en dessous et revenant à fleur d'eau au vent de la yole. Un seul homme, le nommé Monsac, fut assez agile pour sauter au bord du vent et, en passant par-dessus la quille de la yole pendant qu'elle faisait son évolution et il évita même d'être mouillé.

M. Mazeras se trouvait à mes côtés dans l'eau, et quoiqu'en parlant il m'eût affirmé qu'il n'y avait rien à craindre pour lui; il m'a avoué depuis qu'il ne sait pas nager, ce qui toutefois ne l'empêcha pas de conserver tout son calme et de m'aider grandement dans toute l'opération. Le deuxième de nos lamaneurs fut, lui, pris de peur et se mit à nager au large de notre embarcation, ce qui nous causa de l'inquiétude: car nous n'avions aucuns nos ceintures insubmersibles: toutefois M. Mazeras le rappela, et avec tant de fermeté, que ce malheureux qui déjà jetait des cris de détresse revint à la yole et reprit son sang-froid. Tout cela fut exécuté en quelques secondes, dès que l'homme qui s'était effrayé à tort fut revenu à nous, moi je nageai au vent de la yole dans l'intention de détacher la drisse de la voile du taquet sur lequel je la croyais encore tournée, ce qui eût été très facile, le bord inférieur de la yole quand elle est dans la position où elle se trouvait alors, étant à peine à cinquante centimètres au-dessous de l'eau; mais je n'en eus pas le temps, car Monsac ayant saisi la relingue du bas de la voile et l'ayant amenée malgré le vice du rocambot, la yole se redressa instantanément avec son mât et je me trouvai dedans avec lui, aussitôt nos deux autres compagnons y remontèrent, et un instant après l'embarcation, vidée par sa puissance d'immersion, se retrouvait vide et bien bastante. Dès que nous eûmes ramassé tout ce qui était sorti du bateau dans son évolution, nous rehissâmes notre voile et reprîmes notre route. Le temps qui s'était écoulé depuis que la yole avait été entièrement chavirée jusqu'à ce qu'elle eût été redressée et vide, a été de deux minutes environ.

Toujours remplis d'un zèle qu'on ne saurait trop louer, des pilotes et des lamaneurs s'étaient précipités dans une yole pour venir à notre aide. De la tour d'où ils nous examinaient, ils avaient vu que nous avions poussé l'expérience plus loin que nous n'eussions dû le faire avant que la température se prêtât à de pareils essais. Mais à la sortie du port, à leur grande satisfaction, ces braves et dignes gens nous retrouvèrent à la voile et avec notre équipage au complet, ce qu'ils vérifièrent de suite à l'aide de leurs longues-vues.

La seule perte que nous ayons éprouvée est celle du cablot, qu'on avait oublié de frapper sur l'ancre qui, elle, est restée dans la yole.

À l'égard du cablot, je vous adresse, M. le Président, la demande de le remplacer en filin d'Alger, car ce filin flotte et ne peut se perdre, il offre de plus un grand

avantage, celui de permettre que l'ancre du canot soit placée de telle manière qu'en cas d'accident ou fortuit, ou provoqué comme celui dont je vous entretiens, ancre et câble aillent à la mer ce qui serait avantageux pour l'exécution des mouvements que doit faire la yole et n'offrirait pas d'inconvénient, puisque le câble flottant garantirait le salut de l'ancre. Il faudrait aussi que la drisse de la voile fût en même filin et la voile en toile de coton; ces objets deviendraient des flotteurs au lieu d'être des poids, ce qui serait très important puisqu'ils opèrent sur un assez long levier. Pour le changement à faire au rocambot, tout important qu'il soit pour les résultats, il n'est rien pour l'exécution; au lieu qu'il porte un croc il ne doit, comme ceux de toutes les yoles de nos pilotes, se composer que de deux anneaux; le premier de 12 à 15 centimètres de diamètre proportionné à la grosseur du mât, le second de 2 à 3 centimètres: au moyen de cette disposition, on fait passer la drisse de la voile à travers le petit anneau, et quand on veut amener, alors même que le rocambot reste en haut, la drisse glisse à travers l'anneau qu'elle traverse et la voile s'amène infailliblement.

Vous savez que la yole n'avait pas été faite pour aller à la voile. Celle que nous avons employée nous était même prêtée par M. Mazeras. Pour que cette embarcation pût, comme le réclame cet habile pilote, naviguer convenablement à la voile, il faudrait que les soupapes fussent entièrement étanches à l'eau venant de l'extérieur. J'ai, vous le savez, deux systèmes de soupapes, dont l'un atteint complètement ce but. S'il n'a pas été employé dans la confection de la yole existante, c'est que la commission de pilotes et marins auxquels j'avais soumis mon projet avant de construire cette embarcation, avait pensé qu'il ne fallait la combiner que pour naviguer à l'aviron (1).

La seconde expérience subie par ma yole a eu lieu le 5 avril.

Un grand brick remorqué, sortant avec flot, est venu se jeter sur la flottille des yoles placées à l'encoignure en retraite derrière la tour François 1^{er}. Serrés et écrasés les uns contre les autres, les malheureux canots ont fini par s'élever hors de l'eau et se rouler pour tomber sur la dimension la moins grande. La yole en tôle était entre une yole à clin, le *Coq*, qui portait contre la muraille de la tour, et un grand canot à franc-bord pour le service de la poste. La pression avait été telle que deux des bancs de la yole ont été cassés entièrement, son plat-bord du bord de terre portait contre la pirogue le *Coq*, ce plat-bord s'est élevé et l'autre abaissé; dans le même instant le canot à franc-bord qui était au large a fait le demi-tour entier si bien qu'il est resté quille en haut. Quand la pression eut cessé, ma yole s'est retournée comme toujours pour se replacer quille en bas; mais lorsque son plat-bord immergé est venu à fleur d'eau, il a rencontré celui du canot à franc-bord qui restait immobile la quille en haut et les tollets de la yole ont passé en dedans de ce plat-bord, de sorte qu'elle ne pouvait se relever sans enlever avec elle ce canot. Cela ne l'a pas arrêtée: portant tout le poids de ce canot, elle s'est re-

(1) Voir la note de la page 5.

dressée et redressée assez pour se vider complètement, tandis que le canot à franc-bord est resté, lui, l'étrave et l'étambot placés horizontalement et accroché sur le tollet en fer de ma yole, comme un chapeau sur un porté-manteau.

Ceci prouve que, même alors qu'elle est pleine d'eau, ma yole possède une grande puissance de redressement. Outre la charge considérable du poids du canot suspendu sur son tollet, elle avait ses avirons, son mât et son gouvernail saisis en drôme au-dessus des bancs et qui la chargeaient sur ses hauts, et c'est malgré tout cela qu'elle est revenue assez droite pour que toutes les soupapes aient été complètement hors de l'eau et qu'elle se soit entièrement vidée sans qu'un seul homme ni quoique ce fût fit contrepoids du côté opposé à celui qui portait le canot.

Par le plus grand hasard je me trouvais sur les lieux au moment où arriva ce que je viens de vous citer et, comme plus de vingt pilotes et lamaneurs en ont été témoins, il sera très facile de constater l'exactitude de mes assertions, mais si vous le vouliez, Monsieur, on pourrait, en votre présence, replacer les deux embarcations dans la position où l'abordage reçu les avait mises, et ainsi faire juger beaucoup mieux, et par vous et par tous ceux que cela peut intéresser, quelle est la force de redressement que ma yole possède. Quant aux avaries qu'a éprouvées la yole, si elle eût été en bois, elle serait très probablement, comme le *Coq*, tout-à-fait irréparable, mais pour la tôle il en est tout autrement : en remplaçant un de ses plats-bords et un de ses bandeaux qui sont en bois, ainsi que les bancs cassés, on fera reprendre à la tôle sa forme première, sauf à appliquer quelques pièces aux déchirures qui pourront exister.

Veuillez recevoir, Monsieur, l'assurance de la considération toute particulière de votre serviteur.

E. LAHURE.

*A Monsieur le baron de la Gatinerie, commissaire général, chef du service
de la marine du Havre.*

Havre, 28 Août 1845.

MONSIEUR LE COMMISSAIRE,

Vous aurez été sans doute informé de la dernière épreuve à laquelle vient d'être soumise ma yole insubmersible.

Le 19 de ce mois, une goëlette anglaise avait fait côte sous le vent de l'entrée de notre port, la violence de la mer était telle qu'aucun de nos pilotes n'osait aller avec les autres bateaux sauver l'équipage de cette goëlette, composé de cinq personnes, qu'on voyait de la jetée attachées dans le grément de leur goëlette coulée sur le poulieu au sud de l'entrée du Havre, et on sait ce qu'osent en pareil cas les pilotes du Havre. Mazeras et son équipage, eux qui ont tant expérimenté ma yole, n'étaient pas sur les lieux : surpris par

la bourasque dans une yole ordinaire, ils se perdaient eux-mêmes dans le fond de Ste-Adresse et y sauvaient à grand'peine leur vie. Cependant grâce à sept braves marins dont un seul, M. Durécu, connaissait ma yole qu'il avait déjà expérimentée de très mauvais temps, elle fut montée et sauva les cinq hommes.

S'il vous convenait, Monsieur, de vous faire faire, par ceux qui ont monté la yole, un rapport sur leur opération, ou de vous informer auprès de Messieurs les membres de la chambre de commerce du Havre de ce qui leur a été déclaré par ces dignes marins, je devrais croire que rien ne s'opposerait plus à ce que l'autorisation que son excellence Monsieur le Ministre de la Marine m'annonçait par la lettre qu'il m'a fait l'honneur de m'adresser dès le 27 janvier dernier vous avoir été donnée de traiter avec moi pour la construction de deux yoles de mon système, devint enfin une réalité.

Je me permettrai de vous citer, monsieur, une seule des circonstances rapportées par le marin Durécu et le pilote de Quillebenf Lefebvre qui était avec lui dans la yole. Des autres hommes qui la montaient, trois étaient ivres et se trouvaient précisément avoir tous les avirons du même bord : au moment où les cinq naufragés venaient d'être reçus dans la yole elle tomba en travers à la lame par la faute de ces trois rameurs et, dans ce moment, elle reçut un coup de mer si fort qu'il déferla en grand à bord, non-seulement elle ne bougea pas; mais quoique surchargée (il y avait douze hommes à bord), elle se vida assez promptement pour que le capitaine naufragé qui s'était jeté sur un chapeau ciré, afin de vider l'eau qu'il croyait restée dans le bateau, n'en eût déjà plus trouvé quand il se mit en devoir de la puiser avec ce chapeau. *Where is the water!* s'écria-t-il.

Or veuillez bien vous rappeler que mon embarcation n'est pas un bateau de sauvetage, que ce n'est qu'une simple yole destinée à mettre en sureté la vie des sept hommes qui doivent la monter quant ils sont obligés, comme cela n'a lieu que trop souvent sur notre rade, d'aller au-devant de navires manquant de pilotes par des temps qui mettent en danger la vie de ceux qui montent les yoles ordinaires.

Sans doute mon système est fait pour s'appliquer à la construction des bateaux de sauvetage les expériences qu'a subies la yole que j'ai construite ne peuvent laisser de doute à cet égard; mais pour cet emploi il faudrait des dimensions plus grandes et au lieu de trois, au moins quatre et même cinq avirons de chaque bord.

Veuillez me permettre, Monsieur, de vous réitérer mes remerciements pour les nombreux témoignages de bienveillance que vous m'avez accordés depuis que je m'occupe de faire expérimenter mes yoles, et recevoir les salutations de votre dévoué serviteur

E. LAHURE.

La goëlette se nommait le « HOLBURNHALL » et ce sauvetage valut au patron de la yole une belle récompense qui lui fut décernée par le gouvernement anglais.

Exposition universelle de Londres.

BULLETIN DE LA SOCIÉTÉ D'ENCOURAGEMENT POUR L'INDUSTRIE NATIONALE.

ARTS MÉCANIQUES. — ARMES À FEU.

Rapport fait par M. le baron Séguier, au nom du Comité des arts mécaniques, sur les fusils de chasse se chargeant par la culasse, présentés par M. Lefaucheur, arquebustier, à Paris.

Depuis longtemps l'on savait que les fusils de guerre dits à balles forcées portaient plus loin que les autres, et cependant l'on avait peu cherché à faire pour des mêmes avantages les armes de chasse chargées avec du petit plomb.

Cela était difficile; le seul moyen d'y parvenir était de les charger avec des cartouches dont le plomb serait séparé de la poudre par un diaphragme d'un diamètre supérieur à celui du fusil. Une telle cartouche ne pouvait être introduite et poussée jusqu'au fond du canon sans un grand effort, et même dans ce cas, sans perdre une partie des avantages recherchés; le corps intermédiaire, placé entre le plomb et la poudre, ainsi comprimé au moment de la charge, se mettrait d'avance en rapport avec le diamètre de l'arme. Lors de l'explosion, une bourre ainsi moulée aurait peu de supériorité sur les bourres ordinaires.

Mais il ne pourrait même en être ainsi, puisqu'un canon de fusil de chasse, pour bien porter le plomb, doit être à son orifice légèrement plus étroit qu'à sa culasse. Pour résoudre le problème, il faut placer la cartouche, préparée comme nous venons de le dire, dans le tonnerre de l'arme, dans une chambre d'un diamètre un peu plus grand que le canon et se raccordant avec lui par une section de cône. Ces armes ne peuvent donc être chargées que par la culasse: c'est ce que plusieurs armuriers comprennent bien lorsque furent imaginés les premiers systèmes de fusils de chasse à culasses mobiles, dits à canon brisé.

Notre projet n'est pas, Messieurs, à l'occasion de ce rapport, de vous retracer ici longuement l'histoire complète des modifications que les armes de chasse ont déjà subies; vous savez tous, Messieurs, que c'est à un arquebustier nommé *Pauly*, qui l'on doit, de nos jours, l'introduction dans le commerce de ces sortes d'armes, Les fusils sur lesquels nous appelons aujourd'hui votre attention vous sont présentés par un armurier longtemps employé dans les ateliers de M. *Pauly*; cet artiste semble avoir à cœur d'amener au plus haut point possible de perfection ce genre de fusils, auquel il a travaillé dès le principe.

M. *Lefaucheur* a exposé sous nos yeux les dessins de diverses modifications par lesquelles il a fait passer l'invention *Pauly* pour l'amener au point où vous la voyez. L'expérience lui a fourni successivement l'indication des inconvénients pratiques que chacune des modifications précédentes entraînait avec elle; c'est aujourd'hui



d'hui que l'expérience a, depuis un temps assez long, sanctionné ses derniers efforts, qu'il vous appelle à en apprécier le mérite.

Le fusil-*Lefaucheux* se compose d'un canon fixé, par une charnière tangentielle, à sa circonférence, à une pièce de fer repliée en équerre contre laquelle va s'appuyer son extrémité inférieure; le canon est solidement maintenu en contact avec cette pièce qui lui sert de culasse, à l'aide d'un tirant en forme de T, dont la tête s'engage entre deux crochets soudés sous le canon. La pièce formant culasse fait en même temps fonction de pièce de bascule, et vient s'insérer à l'ordinaire, dans les bois, entre les deux platines comme le prolongement de la pièce de bascule. La tête du T est construite de façon à remplir le double office de tirer en joint le canon contre la pièce formant culasse lorsqu'on veut fermer le fusil pour faire feu, et de soulever légèrement le canon pour vaincre l'adhérence des pièces les unes contre les autres lorsqu'on se dispose à introduire une nouvelle cartouche.

Tantôt c'est un levier particulier, tantôt c'est le pont de sauvegarde qui sert à mettre le T en mouvement. Dans ce fusil, le feu est mis à la poudre, comme à l'ordinaire, par la percussion d'un chien sur un piston tarrandé dans le canon.

En examinant cette arme avec attention, vous vous demandez peut-être pourquoi la charnière qui réunit le canon avec la monture a été ainsi placée au dessous du canon, et pourquoi le tirage ne se fait point dans l'axe? Cette réflexion s'est présentée à notre esprit; nous devons la prévenir de votre part en vous communiquant les motifs qui ont porté M. *Lefaucheux* à en agir ainsi. Le tirage dans l'axe, pour opérer la juxtaposition de l'extrémité du canon contre la pièce formant culasse, ne peut s'obtenir qu'avec des plaques de côté; mais l'expérience a démontré que bientôt les plaques éprouvent par le feu une altération bien remarquable.

Ce phénomène, observé dans les fusils à plaques, est assez curieux pour que vous nous permettiez de vous en entretenir un instant.

Dans ces sortes de fusils, après un service même assez court, une rainure se fait bientôt remarquer, correspondant au point où se termine le canon; ce creusement, qui finit par devenir assez profond, opéré dans de l'acier ou du fer trempé en paquet plus dur encore, puisqu'on ne le recuit pas, est-il le résultat d'une action mécanique du gaz dans sa fuite, ou plutôt n'est-il pas le produit d'une action chimique par la combinaison du soufre de la poudre avec le fer? C'est, Messieurs, le fait que nous avons à cœur d'éclaircir. Après un examen attentif, nous avons reconnu que le point corrodé acquiert une dureté bien supérieure à tous les autres points de la plaque; nous avons vérifié qu'une telle altération ne s'aperçoit point, ou du moins d'une manière tout à fait insensible, sur la lame de cuivre insérée entre les canons pour s'opposer à la communication du feu de l'un à l'autre. Cette lame, dans la condition la plus favorable, ne durait qu'un temps extrêmement court lorsqu'elle était en acier, et c'est l'expérience et l'observation qui indiquerent à M. *Lefaucheux* la substitution du cuivre à l'acier.

Le bon état des lames intermédiaires en cuivre dans des fusils dont les plaques de côté étaient déjà profondément sillonnées ne nous laisse plus aucun doute sur la cause de cette détérioration.

Sans écarter l'influence de l'action mécanique, nous l'attribuons principalement à la combinaison chimique que nous venons de signaler.

M. *Lefaucheux* eût donc pu garnir avec avantage les plaques de côté avec du cuivre, mais il a préféré attaquer le mal dans sa racine; il a cherché à se débarrasser complètement des plaques de côté, et c'est ainsi, Messieurs, qu'il a été conduit, pour éviter ce dernier inconvénient, à la disposition qu'il vous soumet.

Cette disposition simple, qui rend la manœuvre du fusil facile et commode, paraissait devoir, enfin, satisfaire complètement les chasseurs ; il en fut autrement : à mesure que l'arme approchait de sa perfection, les exigences croissaient ; ne pouvant plus adresser de reproches au mécanisme, ils se plaignirent qu'il n'obvialt pas complètement à la déperdition du gaz.

Cette fuite, suivant la croyance du plus grand nombre, offrait le double inconvénient de diminuer la portée et de noircir les doigts : nous ne pouvons, quant à nous, lui attribuer que cette dernière incommodité.

Quoique bien léger, ce dernier reproche était fondé. M. *Lefaucheur*, désirant satisfaire, en tous points, les chasseurs nombreux qui l'honorent de leur confiance, se remit à l'œuvre sans jamais désespérer du succès ; ainsi, pour surmonter un dernier obstacle, il fut amené à faire, aux fusils, la plus heureuse application du principe de fermeture des presses hydrauliques ; nous voulons parler de ce cuir emboîté, dont les bords s'appliquent contre les parois d'un vase avec d'autant plus d'énergie, que le liquide qu'il contient se trouve plus comprimé et a plus de tendance à s'échapper.

Vous concevez, Messieurs, qu'en adoptant ce principe de fermeture pour les fusils, comme il ne s'agit point de s'opposer à la fuite d'un liquide, mais à celle d'un gaz enflammé, il convenait de modifier la matière de l'obturateur ; aussi n'est-ce pas une calotte de cuir, mais un culot de cuivre mince dont M. *Lefaucheur* coiffe ses cartouches. Les bords flexibles de ce chapeau, qui a la forme d'une grosse capsule, se dilatent au moment de l'explosion, et s'appliquent contre les parois du canon avec une telle justesse, que, désormais, la plus légère fuite devient impossible.

Ce moyen, aussi simple qu'ingénieux, qu'un esprit observateur a su emprunter à la presse hydraulique pour en faire une si heureuse application, mérite de fixer votre attention : nous le regardons comme un des plus utiles perfectionnements apportés depuis longtemps aux armes de chasse chargées par la culasse.

C'est, à notre avis, un véritable service rendu à l'arquebuserie entière ; par son emploi, les combinaisons de fermeture les moins exactes seront mises à l'abri des fuites de gaz, et désormais ce ne sera plus l'exactitude, mais seulement la solidité de la fermeture, qui rendra le problème de la confection des armes à culasses brisées difficile à résoudre.

Extrait du Moniteur.

Le volumineux rapport du jury central sur les produits de l'agriculture et de l'industrie exposés en 1849, vient de paraître. Nous en extrayons les passages suivants, qui concernent les armes à feu connues sous le nom de fusils Lefaucheur, auxquelles cet ingénieux fabricant a fait faire de si notables progrès, et dont le système obtient un succès aussi grand que légitime.

M. Lefaucheur a absorbé la réputation de son prédécesseur dans la sienne.

Les perfectionnements apportés par cet arquebuser aux fusils qui se chargent par la culasse ont été si nombreux et ont une telle importance que le nom de Pauly est maintenant oublié, tandis que celui de M. Lefaucheur se trouve attaché pour toujours aux fusils à bascule.

C'est lui qui, le premier en 1828, a fait adhérer le canon à la pièce de bascule, en supprimant la rosette, ce qui eut pour effet de rendre beaucoup plus facile l'application de divers systèmes qui se sont produits depuis.

En 1832, il fit le fusil à charnière, connu sous le nom de fusil Lefauchaux, qui portait une cheminée sur le canon. En 1834, il inventa le culot-bourre, qui augmenta la portée, et en 1835, il appliqua la broche qui est aujourd'hui généralement adoptée.

Cette année, M. Lefauchaux présente un fusil qui produit l'inflammation au centre de la charge, et avec lequel il n'y a aucun crachement possible.

Comme nouveautés, il présente en outre des pistolets à 4, 5 et 6 coups, auquel il a fait l'application de la cartouche. Montés sur une broche passant dans un tube autour duquel ils sont réunis, les canons s'enlèvent après qu'on a dévissé un écrou ajusté au bout de la broche. On introduit alors la cartouche dans chacun d'eux, après quoi on les remet tout d'une pièce, et ils sont fixés de nouveau par le moyen de l'écrou. On conçoit alors comment la charge de ces armes devient prompte et facile, sans présenter le moindre danger.

Ce système s'applique avec avantage aux pistolets de salon.

On voit que les titres par lesquels M. Lefauchaux se recommande à l'attention du jury sont nombreux et réels.

Nous allons rappeler successivement les diverses récompenses qu'il a obtenues aux précédentes expositions.

Il lui fut accordé une mention honorable en 1827; en 1834, le jury lui décerna une médaille de bronze, et en 1839, il fut récompensé par une nouvelle médaille de bronze.

Depuis cette époque, M. Lefauchaux n'ayant pas cessé de travailler à perfectionner les armes dont il est l'inventeur, le jury lui a décerné une médaille d'argent.

P. S. Depuis l'exposition dernière, M. Lefauchaux a apporté aux fusils de son système et aux armes ordinaires un perfectionnement important, c'est la suppression du tiroir ou de la goupille, qui réunissent le canon au corps de l'arme, et qu'il a remplacé

par un agencement aussi simple que facile à démont

Nous ajouterons que le fusil Lefauchaux est aujourd'hui entre les mains de dix mille chasseurs.

Vingt années d'expérience ont démontré sa supériorité sur tous les systèmes de fusils à charger par la culasse, qui ne sont en réalité que des reproductions plus ou moins dissimulées du système Lefauchaux.

A tous les avantages connus, qui sont la base de sécurité pour le chasseur dans l'usage de ces fusils, tels que l'impossibilité des erreurs de charge, l'inflammation de la poire à poudre, l'explosion d'un coup pendant qu'on charge l'autre, en tenant le canon le plus souvent en face du visage, etc., etc., le fusil Lefauchaux a le mérite tout particulier et inhérent au système, qu'il laisse voir continuellement si le fusil est chargé au moyen de la broche qui sort en dehors du canon, et qui comme le chien indique l'état dans lequel l'arme se trouve.

Généralement on ne se préoccupe pas assez de ce qu'il y a d'imprévoyant et de dangereux dans une arme qui ne répond pas positivement à ces deux questions.

L'arme est-elle chargée ?

Le fusil est-il armé ?

BY HER
MAJESTY'S



ROYAL
LETTERS PATENT.

LIGHT'S PATENT

LIFE-BOAT. BUOY, BELT, AND GENERAL MARINE BUOYANCY COMPANY,

216, HIGH STREET, WAPPING.

(Near the entrance to the Thames Tunnel.)

The object of this invention is to render ordinary ships' boats so buoyant that they virtually become Life-Boats, and are capable of saving the Crew and Passengers under almost any circumstances. The material employed is naturally extremely buoyant, and, by the process to which it is subjected, is rendered impermeable to moisture. By filling the spaces between the timbers and beneath the thwarts with this material, previously made up into properly proportioned packages, and then covering the whole with a thin lining of boards, a boat is rendered so buoyant, that even when overloaded with passengers, should the waves break over it, there would be no risk of its sinking; or should even the bottom be stove in, the frame would float and act as a raft, which the material, from its tenacity and fibrous nature, would hold together. The specific gravity of the material is so very small, that the additional weight to the boats is scarcely felt in hoisting them on board, and no injury can be caused by driving nails, or by blows, as is the case with metallic or cloth air tubes, cases, &c.

The process can be advantageously applied to the bulwarks and between the timbers and the ceilings of ships; and it must be evident, that in the event of their going to pieces, each portion would, from its power of flotation, become a life-buoy. It should be remarked, that the material can be adapted in any bulk, in any form, and to any part of the ship or boat usually left vacant, and consequently, that it will not diminish the space for stowing the cargo; and that the mattresses, couches, seats, and all the furniture could be rendered subservient to saving life.

The same principle can be applied to jackets, belts, life-buoys of all kinds, travelling trunks, cases for valuables, and for floats for fishermen. The life-belts are unequalled in lightness, can be adjusted in ten seconds, and are incapable of being injured by puncture or climate.

Pleasure boats that are now so crank as not to be able safely to carry canvass, may be rendered quite stiff, and be enabled to carry any pressure of sail that their masts and spars will bear; wager boats and wherries may be so prepared that it would be impossible to sink them.

Ships' Skiffs or Long Boats may be fitted to carry out anchors in case of necessity, without any possible risk of sinking.

Lug Boats and Lighters will carry considerably more weight when fitted with this buoyant material.

The material can be immediately applied to any ordinary boat, without altering the form of the boat; its cost is less than that of any other article now in use for the purpose; it is more durable and more buoyant, and its specific gravity is 150 per cent. less than that of cork.

A boat, twenty-one feet long, built for a ship's Life Boat, has been tried and proved to carry eight tons, and can be seen at the Depot, 216, High Street, Wapping; the space required for the material in the fitting up is not more than from three to four inches in the breadth of the boat.

In all boat actions and boarding, the importance of the invention cannot be over-rated, as a boat may be riddled with shot, and still be manageable either for advance or retreat, while the crew, if supplied with rowing belts in addition, would be prepared for any emergency in the operation of boarding; and as these belts will resist a musket ball, the men would be placed in a much more advantageous position for the attack, while such is their lightness, that they would in nowise impede the requisite exertions of the rowers or boarders. Indeed, in all military operations, the principle may be used with advantage, for the conveyance of troops, cannon, and baggage across rivers in pontoons and flat bottomed boats, while the material, as prepared for giving the additional buoyancy, may simultaneously be converted into temporary breastworks.

In testing its buoyancy against an air tight case, 3lbs. of the material bore up 67½ lbs. weight, the case with air bearing up 63lbs. only, being 7½ per cent. in favour of the substance; while in addition to this important advantage, should cases containing the material in Life Boats be broken or damaged, it maintains its buoyant properties, *while air, under such circumstances escapes, and water occupies its place.*

The Company are prepared to execute orders to any extent, and to offer tenders for any work which may be submitted to them.

Masters of vessels may have their own boats fitted and made perfectly buoyant and durable, by sending them to the Depot, 216, High Street, Wapping, or to their Boat builders, as the Company will grant Licences for the use of the Patent, will attend to the progress of the work, and will forward the prepared materials to any Boat Builder in Town or Country.

* Applications for Licences, from Ship or Boat Builders, or for Agencies, and all other communications to be addressed to JAMES BEATTIE, Esq., Solicitor to the Company, 26, Hans Place, Chelsea, London.

TESTIMONIALS, &c.

By command of His Royal Highness Prince Albert, Mr. H. G. Robinson, Captain Light, and Mr. C. Manby, Secretary of the Institution of Civil Engineers, attended at Buckingham Palace, on Friday morning, to present a beautiful life-boat, constructed on a peculiar principle for His Royal Highness the Prince of Wales. The following are the dimensions of the boat:—

	Feet.	Inches.		Feet.	Inches.
Length over all	20	0	Breadth at the back-board thwart	2	11 $\frac{1}{2}$
Ditto on the keel	17	4	Ditto at the rowlock	3	7 $\frac{1}{2}$
Breadth at the main thwart	3	2 $\frac{1}{2}$	Depth	0	11 $\frac{1}{2}$

She is constructed of bird's-eye-maple, the linings, saxboards, and thwarts being of Spanish mahogany; her keel-band, stem bend, and rudder hangings, are of bronze, the rudder of maple, with a carved yoke, gill, and silk lines and tassels of crimson and gold colour. She is also fitted with an elegantly carved chair, the seat of which is covered with crimson satin damask, with an elaborate pattern in raised velvet of the same colour, the back being supported by the Prince of Wales' feathers, carved in maple and heightened with gold. The rowing mat is of the same material as the cushion of the chair, and there is a small foot-ottoman of Utrecht velvet. The sculls are of mahogany and very light. The boat, which is a "single wsculling skiff" is lined throughout between the timbers with Captain Light's patent material, which gives to her all the buoyancy and other properties of a life-boat.

In some recent trials of this principle on the boats for the Preventive Service at Deal, it was found to render them extremely buoyant, and at the same time to stiffen them very much under canvas; and as the hazardous services on which these boats are employed are such as to place them continually in imminent danger of being swamped, the adoption of this system, both for them and for the boats of H. M.'s service generally, would be of great value, and would tend to prevent loss of life and sacrifice of property.

The experiments showed that boats lined with Light's buoyancy material were capable of carrying a full complement of hands, with much more dead weight than usual, and yet, when filled gunwale deep with water, they could not be submerged. The same principle has been extensively used in the construction of swimming belts, life-buoys, &c., and for the stuffing of yacht cushions, mattresses, &c.; and as the material used is merely light tough rushes, properly prepared, and only three fifths the weight of cork, no injury can ensue from puncture or cutting, as with air cushions, or the destruction of the elasticity, as in the case of cork shavings. Two beautiful specimens of swimming belts and small life buoys were presented with the boat, for the use of His Royal Highness.

Since the presentation of the boat to His Royal Highness the Prince of Wales, Her Majesty and His Royal Highness Prince Albert, have been pleased to convey their thanks to the gentlemen interested in the undertaking, and to signify "their approbation of the principle," as well as their admiration of the boat, which they "consider a beautiful specimen of skill in boat-building."—Vide the Times, CHRONICLE, Post, HERALD, DAILY NEWS, &c., and all the Weekly Papers, June and July, 1849.

By the permission of H. R. H. Prince Albert, this Boat is on view in the Gallery, immediately over the East entrance, of the "Exhibition," Hyde Park.

Surrey Boat House, Lambeth, December, 20th, 1847.

DEAR SIR,—I have adopted your Life Buoys in the Vessels of the London and Westminster Steam-boat Company, and have great pleasure in saying that they answer every purpose in flotation, and are very superior to the metal ones, as they are not liable to be broken, or even injured, by their being trod on or jammed together.

To CAPTAIN LIGHT.

I am, Dear Sir, your's truly, W. P. SAWYER.

Mill Wall, Poplar, December, 24th, 1849.

SIR,—I have fitted a boat with your Patent Buoyancy, and I have the pleasure to say, I think it the best that has been invented for general purposes; being elastic, it is not liable to get damaged, as the metallic air tubes and other inventions of the present day.

To CAPTAIN LIGHT.

I am, Sir, your's, most obediently,

THOMAS FISHER.

London, January 24th, 1848.

We, the undersigned, do hereby certify, that we have tried Light's new invention of Life Preservers, and do consider they surpass any others hitherto seen, and do feel satisfied that the Life Belts are specially adapted for Watermen and Lightermen, as they do not impede the progress of rowing; we do therefore sincerely recommend them for the preservation of life.

ROBERT COOMBS, R. NEWELL, WM. ELGAR.

Obs.—These are celebrated Watermen of the River Thames.

Hull, March 21st, 1848.

SIR,—I beg to inform you that the Boat belonging to the Steamer "Monarch," of Hull, fitted by you, answers my expectations in every respect. I have had sixteen men in her, in the presence of several Captains and Pilots, and am happy to inform you that she was very stiff and buoyant, and answers better than I anticipated.

To CAPTAIN LIGHT.

I am, Sir, your obedient Servant, R. LANCASTER.

Skipsen Cottage, August 5th, 1848.

SIR,—I received the life-belts quite safe and am much pleased with them, as on a trial I found them all that could be desired, and much more buoyant than I expected; but in order that no mistaken idea may be formed of their utility, I will tell you precisely how I have caused a trial to be made, and then you can safely commend them at sea. I went out with my two men in my boat for the purpose, and one of them put on the belt, dressed in his usual clothes; we rowed to a depth of 8 feet water, which I sounded myself, and the man jumped into the sea; he went down of course first with a plunge, when he immediately lifted, and kept a considerable time playing about, and would not make the boat again, but when he had proved the safety he was in with the belt, he went ashore; on landing, of course I wished to know from him exactly how he felt, and the following is distinctly what he stated:—"when he plunged he went to the bottom and touched it for an instant, but rose naturally, without any exertions on his part, after which he tried all manner of ways to get down again but could not. He could stand (if I may so express it) in the water with his hands at his side and perfectly motionless, and declares that if we had given him a pipe of tobacco out of the boat, he could have smoked it very well; in fact he declares that he tried all he could to sink, but could not. I should add that he had on his fisherman's boots, which were very large and wide, coming up to his hips; these boots I have weighed, and they weighed 13lbs. independently of the water, which must naturally have got into them when immersed; there could not at the least be less than two gallons of water in them. The foregoing I saw myself, and can therefore vouch for its truth, and my man is ready and willing to repeat what I have told you; should you want him his name is JOHN SIMPSON; he weighs 10 stone 4 lbs., and is about 5ft. 5in. high. I send you these particulars, that you may see how serviceable the belts are at sea, and for the benefit of those poor fellows who at any time may unfortunately fall overboard, or otherwise.

The above statement is a true account of the trial I made with Light's Patent Life-Belt, in the sea, off Skipsen.

JOHN E. ROBINSON.

JOHN SIMPSON, Salmon Fisher

25, Lincoln's Inn, 15th June, 1849.

I enclose a Check for the Buoys supplied to the Sons of the Thames Steam Packet Company, their value has been proved, for they lately saved two valuable lives.

HENRY AVIS, Secretary.

Deal, June 22nd, 1849.

I have much pleasure in stating that the Boat you fitted for me far exceeds anything I could have expected; I first drew the plugs and let her fill as deep as she would, (which was only up to the thwarts,) I then had a ton dead weight and two men put into her which took her down to the gunwale; below this I could not sink her.

H. NORTH.

17, Tooley Street, July 23, 1849.

I have great pleasure in bearing testimony to the valuable properties of your buoyant material for lining boats, &c., having lately tried the Boat you fitted for me. We sailed her through Blackwall Reach with a strong northerly wind, having filled her with water to the top of her Cabin Comings, 4 inches above her deck, she turned through the reach as steady as an old sand barge, she was then so buoyant we could walk about the deck as when perfectly free from water; she had, including her 4 cwt. iron keel, about 14 cwt. of iron ballast, chain cable, anchor, and sundry stores.

HENRY VAN.

Obs.—Mr. Van has had three boats fitted on the same principle.

Deal, 27th December, 1849.

DEAR SIR,—Having had I think as good an opportunity as any person could have, to test the utility of your patent floating material, I have no hesitation in saying, that I consider it fully to answer the purpose intended; and I assure you on several occasions during the last season I landed and embarked Passengers, when there has been so much sea on, that had my boat not been fitted with your material I could not have ventured. I am about having another boat built and intend having her fitted quite up to the gunwale with your patent. Wishing you a very extensive use of your valuable invention.

To CAPTAIN LIGHT.

I am, Dear Sir, your's very truly,

W. NORTH,
Steam Packet Agent and Pier Master.

Extract from letter of Mr. Macgregor Laird to Editor of "Nautical Magazine," (No. 5, for May, 1850.) on the subject of his Iron Sectional Boats.—"I may add, that I propose making all boats for passenger vessels Life Boats, by using Light's prepared Rushes, which are much superior to any system of air chambers."

London. September, 27th, 1849.

SIR,—It gives me great pleasure to recommend to Masters and Ship Owners your Patent Life Buoy. On my last passage from London to New York, in the Ship "Ocean Queen," one of my crew fell from the jib-boom, the Ship passing over him, running six knots, with considerable sea; one of your Buoy's was thrown to him, and undoubtedly saved his life, having supported him with perfect ease for some fifteen minutes, when we picked him up, the man then pulling an oar to the Ship back.

I have had many Life Buoy's of different constructions, but I consider yours far preferable to any now in use, combining the great requisites of lightness, durability, and great buoyancy. I will only add, that I could never be without them, and I trust that they may come into general use, for I am convinced that they will be the means of saving the lives of many poor fellows, who would otherwise lose their Mess.

TO CAPTAIN LIGHT.

Respectfully, Your's, R. H. GRISWOLD, Master of the Ship, "OCEAN QUEEN."

Extract from the "Liverpool Times, dated March 6th, 1851.

"The exhibition in the Exchange room to-day, of the model of a boat fitted with Light's Patent Buoyancy, attracted considerable attention, and it is evidently a most valuable invention; the principal feature in it, being its simplicity, durability, and buoyancy; and if the following extract can be depended on, no ship should leave the port without at least one boat being fitted with the material. In testing its buoyancy against an air tight case, 3lbs. of the material bore up 67 lbs. weight, the case with air bearing up 63lbs. only, being seven and a half per cent. in favour of the substance; while in addition to this important advantage, should cases containing the material in life-boats, be broken or damaged, it maintains its buoyant properties, while air, under such circumstances escapes, and water occupies its place. As regards emigrant Ships, though, perhaps it might be expensive to fit a whole vessel with the buoyancy, it is more than probable that an increased rate of passage money might be obtained, which would otherwise be impossible, would tend to shorten the passage, and would be in itself a considerable advantage. The dangers incurred by those "who go down to the sea in ships," are quite numerous enough to cause us to hail with pleasure any invention calculated in any way to lessen them." This model, and also one of Life Boat, is in the charge of Mr. G. M. Pearce, 4, Exchange Alley, Liverpool, where they may be seen on application to him.

Coves, August 1st, 1851.

DEAR SIR,—We feel great pleasure in testifying to the valuable properties of your Patent Buoyancy, which we fitted to a 22ft. Boat. We drew out the plugs, and let her fill as far as the Buoyancy would allow her; we then put six men into her, and sent them (with the plugs still out) rowing about for two hours, or had it been twenty-four hours, it would have made no difference, for the water never reached the thwarts.

For Yachts, Gigs, and all other description of Boats, the invention is invaluable, with the important addition, that Boats fitted with your Buoyancy, are not much above half the weight and price of Boats fitted on any other principle. Trusting you may meet with the success you deserve,

TO CAPTAIN LIGHT.

MICHAEL RATSEY & SON.

We, the undersigned Boatmen of Yarmouth, do hereby certify, that we composed the Crew of the Ships' Life Boat, entered by Mr. Edward Light, of London, in the Match for Life Boats, at the Yarmouth Regatta, on Tuesday the 5th instant, and that she proved herself to be in every respect most excellent in construction and principle, being extremely buoyant, and rowing easily and lightly, even when the plugs and valves were open for the free passage of the water through the bottom.

That though she was only one third the dimensions of most of her competitors, and proportionately manned, and consequently overmatched in power, especially in the heavy sea running, she managed to hold her own; and at the conclusion of the trial, when the signal was given for all the Life Boats to run on shore, to prove their qualities under such circumstances, the plugs being out, Light's Boat was the only one that obeyed the order, by signal from Mr. Light himself. That the Boat was rowed by us through the heavy surf, and a safe landing effected, without any casualty whatever, or any danger of being turned over, and we were enabled on touching ground, without difficulty and to the surprise of every one, to get the Boat up beyond the reach of the seas, which tumbled in upon the beach. That we were on this occasion each supplied with one of Light's Life Belts, which are admirably calculated for the purpose intended, as while they would undoubtedly ensure the safety of the wearer, in case of falling over-board or immersion, they do not impede his movements or exertions in rowing in any way, and we confidently believe that a Boat fitted on Light's principle, and the Crew supplied with his Life Belts, would be equal to any service or danger in which they might be called upon to engage. Dated this sixteenth day of August, 1851,

John Thomas, Master of the Fishing Lugger, FAITH;
William Frostick, Master of the Fishing Lugger, MOSKEY;
W. Chambers, Fisherman;

The above is a true statement, and I also state that she came in third best in the Rowing Match, notwithstanding the great difference in size and number of crew.

John Admons, Master of the Fishing Lugger, WELCOME HOME;
Mile Thomas, Master of the Fishing Lugger, TWO FRIENDS;
John Barber, Fisherman.

GEORGE BROWN.

Mate of the Trinity Tender, Yarmouth, and Steersman of Light's Life Boat in the trial above mentioned. We have thoroughly tested the Life Belts, and proved them to be by far preferable to any other that we have tried.

JOHN THOMAS, Jun., W. CHAMBERS, JOHN BARBER.

List of Yachts, and Names of Owners, whose Boats have been fitted with Light's Patent Buoyancy, on the principle of the Patentee, by Mr. Camper, Yacht Builder, Gosport, Hants.

	Tons.	Boats.
ERMINIA	220	64
DREAM	124	1
Lotus	187	2
		1
In addition to the above, a great number of Boats of almost every description have been fitted with the Buoyancy by the Patentee at the Depot.		

RURIK	64	Prince Nicolas Labanoff de Rostoff
ROGNÉDA	160	Prince Alexandre Labanoff de Rostoff
DOLPHIN	220	William Smith, Esq.

Models and Specimens are shewn at the "Exhibition," Hyde Park, at the North West Corner of the Western Gallery, near the Naval Department.

AGENTS ALREADY APPOINTED.

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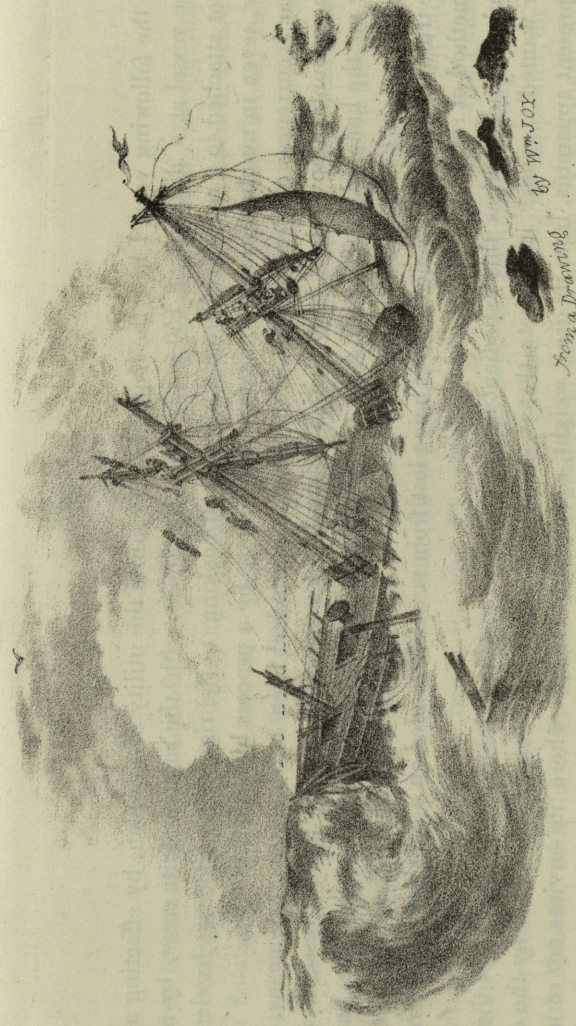
LIFE-BOAT, BUOY, BELT, AND GENERAL MARINE

BUOYANCY COMPANY,

216, HIGH STREET, WAPPING.

TESTIMONIALS, &c.

W. K. CHORTS, Printer, 10, Duke Street, Bloomsbury.



A SHIP STRANDED ON A LEE SHORE.

COMMEMORATIVE ADDRESS

ON THE

GREAT EXHIBITION OF WORKS OF INDUSTRY OF ALL NATIONS.

To His Royal Highness the Illustrious Founder and the Royal Commissioners appointed by Her Majesty for carrying out the noble Design for displaying the Productions and inventive Labours of all Nations, in London, in the Year 1851.

A project so perfectly original is rendered historically memorable as well as remarkable, by the arrangement made for the *universal promulgation* of whatever tends to the benefit and happiness of the civilized world; it therefore becomes the duty of every one to contribute his aid, be it ever so humble, by submitting productions designed to promote so glorious and benevolent an undertaking.

It is under these feelings, I take leave most respectfully, as well as humbly, to submit a subject which has long occupied my serious attention, and highly deserving the consideration of all Nations, in that of *Saving the lives of Sailors from Vessels stranded on a lee Shore*; considering that class of men so necessarily important to the welfare, commerce, and prosperity of the world, for it is by their toil the interest of every country is affected, as well as their naval fame secured.

As founder of a plan to effect this service, I humbly lay claim to such honour; and respectfully support my pretensions to it from the following facts: it being now nearly half a century since my attention was first drawn to the subject, by my appointment to a Military situation on the east coast of the kingdom—a part especially renowned for the number of fatal shipwrecks, and where I was assured by very old inhabitants, and which had been handed down to them by tradition, that never had a winter passed without several cases of stranded vessels, occasionally attended with considerable loss of life, for the want of more powerful means than human strength of projecting a rope against a furious wind, for the deliverance of the crews.

Having witnessed on several occasions, with heart-rending sorrow, instances of this calamity, and failures of the methods then in use for such purposes of preservation, but especially on the 18th of February, 1807, in seeing 67 persons perish within fifty yards of the shore, after the fruitless and strenuous endeavours of some hours, I could no longer yield to the received opinion that the successful application of gunpowder was impracticable.

I publicly declared that, if Providence spared my life, similar melancholy occurrences should be prevented. At length, after numerous experiments, I overcame the difficulty, producing a connecting medium between the shot and a rope, impervious to the influence of gunpowder, by common ox hides. On the 12th of

February in the following year, I had the happiness to confirm the utility of my plan, by effecting a communication with a vessel at a distance of 150 yards from the shore, with the rescue of its crew, by means of a grappling shot attached to a rope, fired from a mortar and hooking to the rigging; a boat was hawled off by it, and the crew, seven in number, brought in safety to the shore by a process hitherto unknown.

Similar occurrences of preservation, after communication had been effected by other means, also introduced by me, amounts to upwards of 1000 British sailors, besides the crews of many foreign vessels; which have obtained for me the honored thanks with gold medals from our gracious adored Queen, and the Sovereigns of four foreign Nations, in having been the means of saving the lives of their subjects: this service has confirmed a memorable truth, that the occurrence of lives being lost from vessels stranded on a lee-shore is now rarely heard of, and my method of rescue is generally adopted.

Useful and successful as this expedient has been proved to effect the object required, yet there is something farther wanted to render it perfect; that is, to prevent the delay so often occasioned by the difficulty in getting the present apparatus, from its great weight, conveyed to the spot where its services are so urgently required, especially when the unfortunate vessel is in momentary expectation of breaking up; also for diminishing the heart-rending scene of distress, and cries of the agonized crew, driven to a state of mental distraction from their horrible situation; nor is it the less required to appease the sufferings of the spectators, by the production of a more *prompt* and simple application to remove the intense human suffering, which no one can conceive but those who have witnessed the piteous supplication for relief.

To effect an object of such paramount importance, from the circumstances just stated, I have considered it a public duty on the present occasion, most respectfully to submit the following methods, by which, in the first instance, a man, without further aid, can convey a small brass gun, purposely constructed, of 25lbs. weight, propelling a shot of 3lbs. in weight, with a line attached to it of sufficient strength for effecting a communication with a stranded vessel, by which a stouter line, and then a rope, may pass from the ship to the shore, and thereby a boat hauled off—a mode most unquestionably the best and readiest for prompt relief. It may be here necessary to observe on the subject of the gun, from its having an ante-chamber at the lower part of the bore, thereby inflaming the charge of gunpowder at the centre, that the shot has been found by experiments to exceed its range by an additional flight of one-third the distance when propelled by its original projectile power.

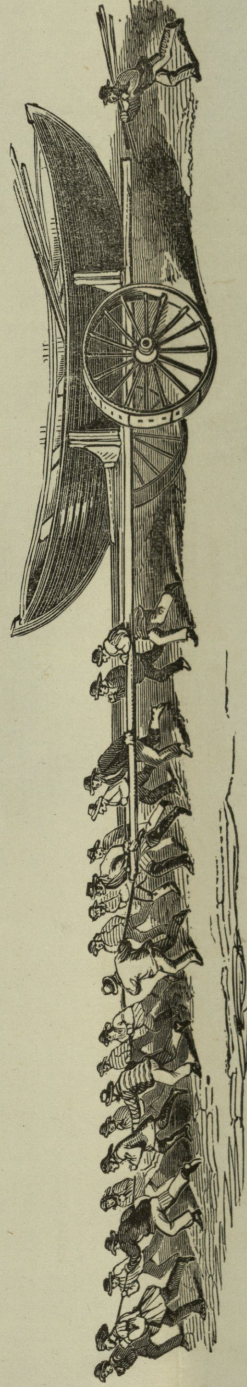
To render the system adapted to the objects in being conveyed by one man, the gun and shot are suspended in a leather socket across his shoulder, with a pouch containing the ammunition, percussion caps, and hammer to strike the caps; also, a frame containing a regularly coiled small line, slung at his back in the manner of a knapsack; a person thus accoutred, if placed on horseback, might accomplish a considerable distance in a very short space of time, and effect the following interesting and humane service here shown.



Having already adverted to the superiority of a boat above all other means, after communication is effected with the wreck, and bringing the crew in safety in the most prompt manner, I submit the model on a suitable carriage to accompany the portable apparatus; in the construction of the boat, every attention has been paid to render it not only a good sea-boat, but possessing the essential qualities of a boat for this service in the simplest and least expensive form, giving to it a gravitating keel to keep it upright; resist upsetting, by cylindrical

copper tubes to surround the inside of the gunwale; rendered impossible to sink, having inflated air bags confined in compartments in a false deck; and discharging scuppers, which, when opened, secure and regulate her proper flotation. Her form is that of a whale boat, 23 feet in length and 7 feet broad, and its carriage having rollers, is only required to have its shafts raised, is easily launched, and by the same process is reloaded, and returns to its station by the numerous persons who are always in attendance on these occasions.

The construction of the boat being so well adapted to the approaching of vessels in distress, at a distance from the land, may, by means of a small sail with which it can be furnished, in many instances assuredly succeed, and, I humbly hope, greatly tend to establish my pretensions to the Fothergill medal, bequeathed by the noble philanthropist of that name, for THE PREVENTION OF SHIPWRECKS AND THE PRESERVATION OF SHIPWRECKED MARINERS, which I respectfully trust and humbly hope the Public will adjudge to me, the reward I have so many years exerted myself to obtain, and feel justly entitled to, having no competitor, for being placed in the British Museum with the other medals there deposited, presented to me by European Sovereigns and distinguished Societies for these Services.



GEO. W. MANBY, CAPT., F.R.S.,

Author of the Plans for Saving Shipwrecked Mariners, President of the British Section of the Société Générale des Naufrages, established in Paris for the interest of all Nations, Hon. Member of the Société des Sciences et Arts, Agricoles, et Industriels des France, and of St. Petersburg, &c. &c.

PEDESTAL-HOUSE, SOUTHTOWN,
1st January, 1851.

SUPERIORITY OF PORTER'S ANCHORS

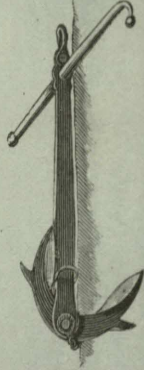
OVER

The Anchors of the Admiralty Plan, or Anchors of any other Plan.

- | | |
|---|--|
| 1.—IN HOLDING POWER, more than one-third, or 40 per cent. | } 1 and 2.—The Admiralty anchors are proved by unerring tests, under the supervision and direction of H.M.'s Officers, to be from 40 to 175 per cent inferior to those of Porter's plan. |
| 2.—STRENGTH, 175 per cent. | |
| 3.—PROTECTION from the danger of the cable fouling the Anchor. | } |
| 4.—PROTECTION from danger in overlaying the anchor. The upper fluke resting on the shank prevents the possibility of either the fluke or arm passing through the bottom of the vessel. | |
| 5.—PROTECTION from injury and danger to the Vessel, on passing over the anchor in shallow water. | } |
| 6.—PROTECTION in crowded anchorage, from the anchor being hooked by the cables of other vessels. | |
| 7.—BITE, immediate, in every kind of ground—hard or soft. | } |
| 8.—STOWAGE. Convenient for stowing in board, by disconnecting the arms from the shank. | |
| 9.—TRANSPORT. May be taken to or from the vessel in two boats, when the anchor is too large for one boat. | } |
| 10.—FISHING. The fishing shackle prevents the hook from slipping, and the anchor is brought to the bows with great facility. | |
| 11.—ECONOMY. No accident can damage more than half of the anchor—viz, the arms, or shank. As they are separate, either can be replaced by new,—thus a saving of £200 in an anchor of 95cwt. | } |
| 12.—WEIGHT. As these anchors are 175 per cent. stronger, and have more than one-third greater holding power, less weight is required. Each anchor would therefore relieve the bows of a first-rate man-of-war of nearly a ton and a half, and thus promote her sailing. | |

All the capabilities of Ships' anchors known at the present time are above enumerated; showing a perfectly just comparison between Porter's anchors and those made on the old, or present Admiralty plan.

The Admiralty Anchors have but three capabilities, viz:—1st.—Holding power; 2nd.—Strength; and 3rd.—Fishing. The first is inferior by 40 per cent.; the second by 175 per cent.; and the third is less convenient, and less secure from accident than those of Porter's



James Boniball
Patentee
Office, 42 Cornhill
London

10.—Officers who have had experience of the anchor fish it more easily than anchors of the common (or Admiralty) plan, by the fish shackle recently attached to the shank, and thus bring the fluke upon the bill-board freed from the fish-hook.

11.—An accident to the Admiralty anchor renders it useless, and of no more value than 4s. 6d. per cwt.

12.—Anchors of light weight relieve the pressure at the ship's bows, and enable her to sail with greater speed. The facility of disconnecting these anchors whenever the cables may be unbent, admits of relieving the ship's bows of the anchor likewise.

10. Officers also must not exercise or the entire
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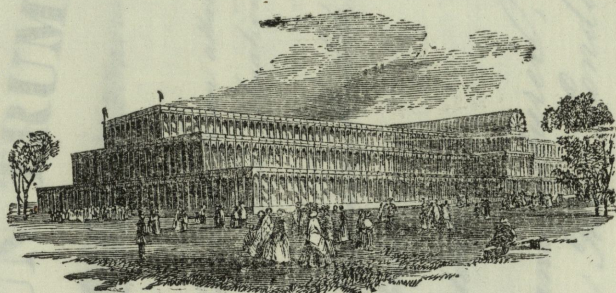
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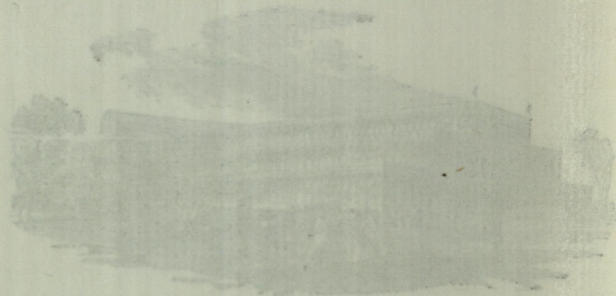
Great Economy.

TO
OFFICERS IN THE ARMY & NAVY.

Having been assigned a very conspicuous position in Class VIII. by Her Majesty's Commissioners at the Great Exhibition, I beg most respectfully to offer to the notice of Officers of Her Majesty's Service, and Gentlemen wearing Epaulets, a Coat or Cloak upon an original and entirely new principle, the construction being in every way complete, combined with ease, comfort, and elegance. It can be worn with or without Epaulets, retaining the same appearance by an effective sleeve, with moveable guards in the shoulder, and will effect a great saving to Gentlemen, as the design is constructed for protecting the Epaulets from disarrangement and damage.

ROBERT POWELL,
DESIGNER,

28, POLAND STREET, GOLDEN SQUARE.



Secret Economy.

TO
OFFICERS IN THE ARMY & NAVY.

Having been assigned a very conspicuous position in Class VIII by Her Majesty's Commissioners at the Great Exhibition, I beg most respectfully to offer to the Officers of Her Majesty's Service and Gentlemen attending the Exhibition a Catalogue upon an original and entirely new principle the construction being in every way complete combined with ease, compactness and elegance. It can be worn with or without the hands resting in the same position by an elastic strap, with movable joints in the fingers, and will effect a great saving in time and space in the display, and will effect the greatest economy in the display.

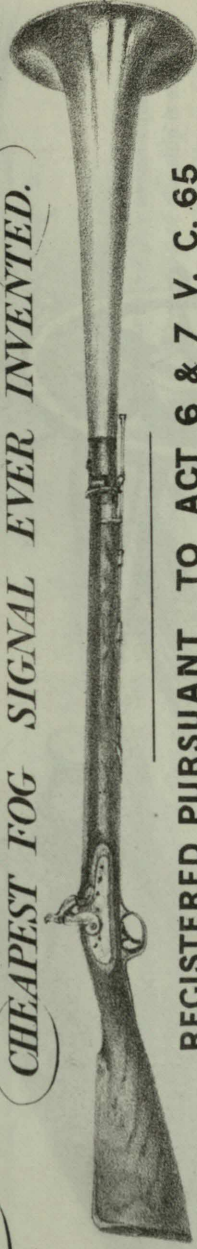
ROBERT POWELL,
DESIGNER,
25, FOLK STREET, GOLDEN SQUARE.

ROBERTSON'S PATENT GUN TRUMPET, FOR GIVING SIGNALS AT SEA IN FOCCY WEATHER.

Or in case of Fire, Accidents,
Collisions, or Shipwreck.

Also on Railways it will be
found the most certain and

CHEAPEST FOG SIGNAL EVER INVENTED.



REGISTERED PURSUANT TO ACT 6 & 7 V. C. 65

Edw. & John, 170, Fleet Street.

This simple but valuable invention consists of an instrument similar to a Speaking Trumpet, fitted with a socket to attach it to the muzzle of a Carbine, Musket or Blunderbuss, similar to a Bayonet which, when fired with an ordinary charge of Powder, gives a report equal to a cannonade.

Brought its many advantages over Carriage Guns, on board Steam Packets, Emigrant or Merchant Ships may be mentioned:— Its portability, enabling it to be used in an instant from any part of a Vessel's Deck or rigging, or by merely having a Carbine, or Musket, kept loaded in the Cabin or Storeage, the Trumpet can be attached as quick as a Bayonet. It answers also for a Speaking Trumpet:— Its cost is small, and it avoids also the annoyance & expense of having to land and reship Gunpowder, every time a Vessel enters or leaves a port. — A Sportsman's flask of Powder, or a few Blank Cartridges, being all that is requisite for a voyage.

Carronades or long Guns, independent of their expense and weight are much in the way on the Decks of Steam Packets, or Passenger Ships, and are seldom available on any sudden emergency; and in the event of a Vessel getting on shore, and a heavy sea beating over her, the Gun Trumpet could be used from any part of the Vessel's Deck or rigging with safety. — In Yachts for saluting, it will supersede the necessity of encumbering their Decks with Guns.

On Railways the Police and Gatekeepers, could signalize during Fogs, any accident or obstruction, with certainty and effect without having to leave their respective posts.

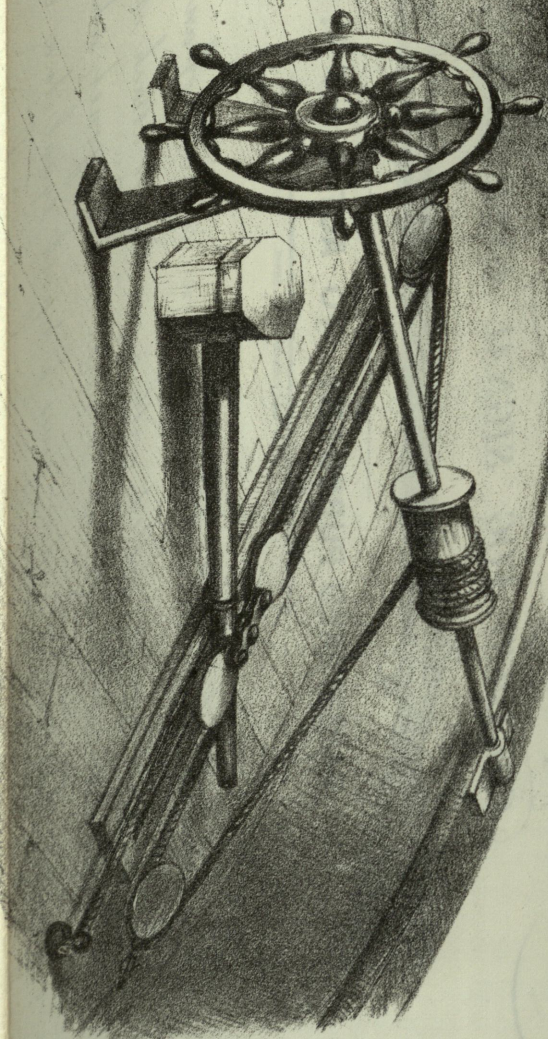
It is eminently serviceable as an alarm, in the event of an attack from thieves, especially in Gentlemen's Houses situated in such retired situations, that the Police are not always on the spot.

The Price of the Trumpet is £4. 10. 0. only; Carbines, Muskets, or Blunderbusses, can be supplied with it also if required at trade prices.

To be had of the Patentee,

*John Robertson, Rope Manufacturer,
Emmett Street, Poplar, & Limehouse Wale, London.
or of his Agents.*

RAPSON & ROBERTSON'S PATENT SLIDE RULE.



This simple and admirable invention having, for above nine years, proved itself the best and safest plan ever adopted for steering vessels, from the first rate man-of-war to the smallest steam-packet, the proprietor to ensure its general adoption, has determined from this date to reduce his price for license to use the same to only Five Guineas for all vessels under 1000 tons, and Ten Guineas for all above that tonnage. Licences granted only by application direct to the Proprietor, or through his agents at the principal outports.

JOHN ROBERTSON, Sole Proprietor.

Rope Manufacturer, Emmett Street, Poplar, and Limehouse-hole, London.

The following vessels, with many others have been fitted, and in no instance has it failed to give satisfaction, viz:—

Her Majesty's ships Queen, 110 guns; Albion, 90 guns; Agincourt, 74 guns; Constance, 50 guns; Juno, 26 guns; Alarm, 26 guns; and steam frigates Penelope, Driver, Stryx, Vixen, Geyser, Growler, Devastation, Spiciful, Virago, Hermes, Firebrand, Thunderbolt, Cormorant, Scourge, Retribution, Gladiator, Dragon, Infexible, Bulldog, Centaur, Avenger; and Sphinx, Locust, and Lizard steam tenders.

The Honourable East India Company's steam frigate Achbar.

The Russian steam frigates Crimee, Odessa, Cherson, Bessarabia, and Transport Irish,

The whole of the Royal Mail steam packets.

The Peninsular and Oriental steam packets Hindostan, Bantuck, Pottinger, Indus, and Ripon.

The steam packets India, 1,200 tons, Chili, 750 tons, Peru, 750 tons, Rose, 300 tons, Thistle, 300 tons, Prince Albert, 250 tons, Fire Queen, 500 tons, Isle of Thanet, 150 tons, South Western, 150 tons, Transit, 300 tons, Gipsy Queen, 500 tons, Fawn 100 tons, and Little Western, 150 tons.

The Italian steam packets Maria Theresa, Pelort, Lilileo, Rondino, and Antelope.

The Brazilian steam packets Pedro Secundo and Imperatrix.

At Port Glasgow.—Messrs. Pollock, Gilmore, and Co's, ships Ann Rankin, Barbara, Lochlilo, Agamemnon, Argo, Achilles, Princess Royal, Fingalton, Achme, Adept, Acteon, Abeona, Marchmont, Bonachan, Allan and Arthur.

At Newcastle.—Messrs. Smith's Indiamen, Ellenborough, Tudor, and Marlborough.

At London.—The ships Urgent, 500 tons, Edmond, 500, Cairo, 300 tons, Ceylon, 410 tons, Diana, 500 tons, Regulus, 400 tons, Orpheia and Ann, 250, Egyptian, 350 tons, Candidate, 400 tons, Sylph, 400 tons, General Hewitt, 950, Wellington, 470 tons, Queen of England, 500 tons, Albert Edward, 350 tons, Berenice, 300 tons, Bucephalus, 500 tons, Lady Flora, 700 tons, Woodbridge, 500 tons, Penyard Park, 370 tons, Marion, 350, Arabia, 350 tons, Venus, 259 tons, Orient, 500 tons, Joseph Somes, 600 tons, Eden, 500 tons, Emily, 500 tons, and many others.

At Greenock and Glasgow.—The steam ship Percursor, 1,800 tons, the Halifax Mail steam packet, the ships, Tecumseh, 460 tons, Arguam, 400 tons, Robert Benn, 700 tons, Harmony, 256 tons, Semiramis, 364 tons, Caledonia, 383 tons, Bramin, 500 tons, Nepal, 462 tons, Topaz, 162 tons, John Gray, 478 tons, Phoenix, 375 tons, Christian 449 tons, Calypso, 379 tons, Hamlet, 200 tons, Ceylon, 498 tons, Coromandel, 660 tons, John Wickliffe, 600 tons, Aberfoyle, 400 tons, Nelson, 490 tons, Brooksby, 423 tons, India, 475 tons, Mogul, 280 tons, St. Andrew, 499 tons, Hebrides, 500 tons, Glenderagh, 560 tons, Oriental, 320 tons, Hong-Kong, 500 tons, Duchess of Argyll, 500 tons, Assam, 300 tons, Queen, 500 tons, and others.

At Liverpool.—Gemini, 410 tons, Bangalore, 500 tons, Velore, 400 tons, Viscount Sandon, 500 tons, Thomas Ripley, 760 tons, Edward Bowsted, 400 tons, and many others.

The following Testimonials among many others have been received.

From Captain BEECHY, Her Majesty's steam-ship Lizard, dated Campbell Town, October 16th, 1840.

"Mr. Robertson's Tiller appears to me a good invention; the Tiller Ropes are always taut, and the Tiller in consequence steady and free from the jerking motion the old plan admitted, especially while at anchor. The steering of the ship is also easier in consequence of the Tiller immediately obeying the motion of the wheel. I consider it is a very good contrivance.

From Mr. JOSHUA DOR, late acting master of Her Majesty's steam-ship Lizard, dated 29th November, 1840.

"Having at the beginning of the late gale, and on several occasions before, seen the utility of your admirable steering apparatus, I feel it my duty to state, that on three instances where I have seen men thrown over the wheel of a vessel, it would not and could not have happened had they had the same. The smallest boy on board the Lizard, steered her during the beginning of the late gale.

"It saves a great deal of friction in the pintles and gudgeons of the rudder, and there is no occasion to lash it in a harbour or roadstead."

Copy of a report to Sir JOHN BARROW, Bart., Secretary of the Admiralty, from JAMES ANDERSON, Esq., master in charge H. M. steam frigate Driver, dated Woolwich, 5th May, 1841.

"Sir,—In compliance with the directions of the Lords Commissioners of the Admiralty, while on board of this vessel, the 1st ult. that I should report on the merits of Rapson's Tiller, I beg to state for their information, that I consider it the best method of steering steam-ships, which has come under my observation, the act of the slide on the Tiller lessening the friction on the ropes nearly one half, in my opinion."

Extract of a letter from the same to the proprietor, dated Devonport Dockyard, 28th June, 1841.

"Having given up the Driver at Portsmouth on Friday last, I am now returned to my duties in this yard.

"Up to the last your Tiller gave me the greatest satisfaction. You should recommend that in all these fine steam vessels, the Tiller should be fitted under the deck, similar to the Driver's, because the ropes can be led up under the wheel in any way most convenient; and it is my opinion that all ships in the Navy would be benefitted by being fitted upon your plan."

Letter from Captain H. MARSHALL, of the ship Urgent, returned from India, dated London, 25th June, 1841.

"The ship Urgent, under my command, having been fitted with your valuable steering apparatus, as its utility is not generally known, I think it my duty to give my opinion.

"During my voyage I always found it a most valuable assistance to the helmsman in blowing weather, or at any time where it was necessary to give the ship helm quickly, as the further the Tiller goes over, the greater purchase the man has over the rudder. The ropes being always taut, there is no fear of the man being hove over the wheel by violent jerking. Another great advantage in the rope or chains being always taut, a great deal of friction is taken off the rudder pintles, consequently they will last much longer, and that constant jerking in the old plan, so annoying to the seamen at the wheel, and the passenger in his cabin, is entirely done away with, while he is enabled by its superior leverage to steer much easier, and with greater satisfaction to himself.

Sir,—Having just returned off a voyage from the North Pacific Ocean, I have much pleasure in bearing testimony to the superiority of Rapson's Patent Slide Tiller, and strongly recommend it to be universally adopted; it not only being easier and safer for the man at the wheel, but the helm is moved quicker than by any method I have before used.

I am, Sir,

Your obedient servant,

HENRY THORNTON,

Master of the Barque Helen.

London, May 29th, 1843.

Extract of a letter from Captain CUNDAY of the barque Berenice, to his owner, dated Mazatlan, Coast of California, December 13th, 1843.

"I should recommend the new ship to have the steering gear fitted as ours, it is a most excellent plan; your rudder is always secure, and the smallest boy can always steer the ship; and when lying-to no fear of the pintles breaking. You can tell Mr. Robertson I am highly pleased with it."

Liverpool, Sept. 28th, 1844.

As I have just returned from a voyage to the East Indies, where I have been trading for almost two years and a half, I take an early opportunity of informing you, that I have found Rapson's Patent Slide Tiller an excellent improvement on any former plan, as the helm is moved much quicker, and is much easier for the man at the wheel as well as being infinitely safer in bad weather.

I remain, dear Sir,

Your most obedient servant,

WILLIAM BELL,
Barque Velore.

Royal Mail Steam Packet Company's Office,

Southampton, Nov. 7th, 1844.

Sir,—I have great pleasure in bearing testimony to the efficiency of Rapson's Patent Tiller in the Royal Mail Steam Packets under every circumstance, and that I consider it a valuable addition to the rudder when properly applied.

I am, Sir,

Your obedient servant,

RICHARD BARTON,
Superintendent.

Extract of a report from H. M. ship *Queen*, 110 guns, relative to the Patent Slide Tiller fitted to that vessel—Vide

Shipping Gazette, July 9th, 1845.

"The Tiller on board the *Queen* answers every expectation, and the ship steers well, carrying a strong weather helm. The Tiller is highly approved of by every watch, she steers very easy."

London Docks, October 12th, 1844.

Sir,—Having recently returned from a voyage to the Australian Colonies, I have much pleasure in informing you that Rapson's Patent Slide Tiller which you fitted to the ship *General Hewett* has given me every satisfaction, although that ship is about 1000 tons register, and the Tiller is fixed below two decks, with the ropes leading up to the wheel upon the poop; one man can steer the ship with ease, unless in very bad weather, and such is the security of the Tiller we have never once had occasion to use relieving tackles.

The rudder being always kept quite steady, and Tiller ropes taut, we have much more comfort in the cabin, being free from the jerking of the rudder, so annoying in those Tillers fitted on the common plan, while the wear of the pintles is much less.

I am, Sir,

Your obedient servant,

JOHN HART,
Commander of the General Hewett.

London, October 23rd, 1844.

Sir,—It is above two years since the ship *Candidate* was fitted with Rapson's Slide Tiller, during which time I have made four voyages to the West Indies, and I can with pleasure say that it has given me every satisfaction: we have often had occasion to test its qualities, when scudding with a heavy cargo, and severe gales of wind, and have then seen, with what ease and security one man could steer the ship, whereas with the old plan great danger and difficulty would have been experienced through the slackness of the Tiller ropes, although aided by relieving tackles.

I am, Sir,

Your obedient servant,

JOHN FOWLER.

Montague Place, Poplar, Oct. 24th, 1844.

Sir,—Your fittings of the Steering Apparatus of the steam ships *Imperador* and *Imperatrix*, which I took out for the Brazilian Government Mail Service, have given the most entire satisfaction both to the Company and myself. Had I been fortunate enough to have had them in the *Earl Stanhope*, the life of the most valuable man among my crew might have been saved, for when lying-to in a heavy gale off the Cape of Good Hope, the poor fellow was capsized over the wheel.

I have witnessed many similar misfortunes, which might have been avoided, had the use of your steering apparatus been adopted.

I am, Sir,

Your obedient servant,

JAMES TILLY.

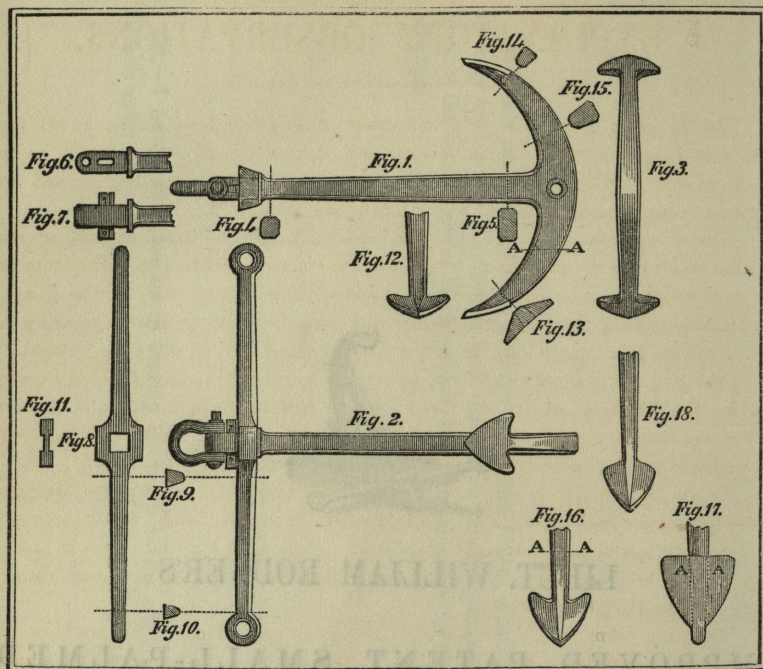


LIEUT. WILLIAM RODGER'S

IMPROVED PATENT SMALL-PALMED
ANCHOR.

EXPERIMENTS TESTING THE HOLDING QUALITIES OF THIS ANCHOR ARE DAILY IN OPERATION
AT THE CRYSTAL PALACE; OUTSIDE THE BUILDING, AT THE WEST END.

LIEUT. WILLIAM RODGER'S
IMPROVED PATENT SMALL-PALMED ANCHOR.



Drawn by WM. RODGER, R.N.

- Fig. 1. A side view of the Patent Anchor, with the Stock in section.
- " 2. A plan of the same, stocked.
- " 3. A back view of the Crown, Arms and Palms.
- " 4 & 5. Sections of the Shank, taken at the dotted lines in Fig. 1.
- " 6 & 7. A side view and plan of the Square, without the Stock, but shewing the Stock-key, Key-guide, and Key-hole.
- " 8. A front view of the Stock.
- " 9 & 10. Sections of the Stock, taken at the dotted lines in Figs. 2 & 8.
- " 11. A plan of the Stock-key-guide.
- " 12. A front view of the Arm and Palm.
- " 13. A Section of the Palm, taken at the dotted line in Fig. 1, and shewing its bevelled form.
- " 14 & 15. Sections of the Arm, shewing its wedge form.
- " 16. A front view of the Patent Palm, and part of the Arm, before it is bent.
- " 17. A front view of the large Palm, and part of the Arm, in common use, for an Anchor of the same weight as Figs. 1 and 2.
- " 18. A front view of the Arm, with a Palm suitable for Stream and Kedge Anchors which do not require to be "fished," and which Anchors are made considerably longer than the "Bowers" of the same weight.

NOTE.—The dotted lines A A, Figs. 1 and 16, indicate the position which the head of the large Palm in common use would assume if exhibited in those figures; and shews that the surfaces on the sides of the Arms of the Improved Anchor, are as great as that of the Corners A A, of the large Palm, Fig. 17, which loosens the ground in front; and if it be of an adhesive quality, causes the Anchor to become "shod." The Hole in the Crown is intended for the Buoy-Chain; and the Holes in the ends of the Stock are for the purpose of saving iron, where it would actually be, in some degree, prejudicial to the holding of the Anchor.

Manufactured by FOX, HENDERSON & Co., at the London Works, near Birmingham; and Orders received by them in London at the Office, 8, New Street, Spring Gardens, and at their Wharf, Fore Street, Limehouse, where the Anchors of all sizes may be seen.

Also at their Office, 3, Exchange Buildings, LIVERPOOL, on application to their Agent, WM. LAIRD.

And at No. 2, West Quay, GREENOCK, by applying to THOMAS HAMLIN, Agent for the Ports on the CLYDE.

EXPLANATORY OBSERVATIONS.

As the safety of much property and many valuable lives depend upon the efficiency of the Anchor, it is natural to suppose that any improvement in the construction of an instrument of such vital importance will meet with the most serious consideration and cordial support of every person connected with the Shipping interest.

Under this impression, the Patentee of the Improved Small-Palmed Anchor, represented by the drawing on the other side, is desirous of explaining, as briefly as possible, its principle of construction, in order to show, that notwithstanding it may have, at first glance, the appearance of being formed to cut through the ground, it does in reality possess a much greater power of resistance than the ordinary large-palmed anchors of the same weight.

The limits of this paper will not permit him to enter into a lengthened discussion on the merits of the different sectional forms hitherto used in the construction of anchors, in order to obtain the greatest amount of strength, with a given weight of iron: he must therefore at present confine his remarks principally to their holding qualities.

In the first place, then, it appears that the inefficiency of the large palm is owing to its loosening the ground in front of it, and to its liability to get "shod," and consequent tendency to rise out of the ground; and when this takes place, no dependance can be had on its again taking hold, and therefore another anchor must be let go, when it would otherwise have been desirable to ride by one.

The small palm, however, does not disturb the ground, which, on the contrary, passes freely over it; and this is to be attributed to its making a more favourable angle with the resisting medium, which gives the anchors thus constructed a natural tendency to penetrate deeper, and without the least liability to get "shod."

This being the case, a ship will never run away with an anchor with small palms, of the form represented by the accompanying drawing, which, if dragged by riding too short, will again hold on, with a sufficient scope of cable; for it has no tendency whatsoever to rise out of the ground.

This penetrating property is likewise possessed, but in a minor degree, by the Patentee's former Small-Palmed Anchor, which has stood the test of several years' trial, and met with general approbation. But the holding quality of the plan now under consideration is, in a great measure, based upon a principle hitherto entirely overlooked in the construction of anchors. Nevertheless its peculiarly advantageous effect can be made quite obvious to the most cursory observer, although at first glance it may appear somewhat paradoxical.

Let us now, therefore, refer to the drawing, by which it will be seen that the present improvement relates principally to the "Arms," the "Palms," and the "Stock."

In the first place, then, it will be seen by the sections, Figs. 14 and 15, that the Arms of the Anchor Fig. 1 are formed on the principle of a wedge, the inside or front being made thinner than the outside or back part. The object of this form is to avoid disturbing the ground in front of the Arms, and to augment the lateral pressure of the ground against the sides of the Arms. For the same reason, and in order to retain as long as possible the rubbing action of the ground against the sides of the Arms, the chamfer on the outside or back part is made smaller than that on the inside or front part; and the Patentee has ascertained, by actual experiment, that the ground, by reason of its elasticity, immediately closes in and rennites behind the anchors thus constructed; whereas the large palmed anchors of the usual

construction, when dragged, leave a wide rut or trench behind them. And, moreover, the arms of anchors of the ordinary construction are usually made of an oval form, or of an oval flattened a little at the sides, and sometimes nearly round.

Now, it is obvious that when any body of a round or oval section passes through the ground, the friction and lateral pressure of the ground ceases, for the most part, to produce any retarding effect, beyond the centre of that body; and it should also be borne in mind that these sectional forms are far from being the best in regard to strength. All curvilinear figures indeed are highly objectionable when opposed to a transverse strain, for in that case nearly the whole force of extension on the one side, and compression on the other, is confined to a few fibres or particles lying on the surfaces, at the greatest distance from the neutral axis; whereas the forms adopted in the construction of the Improved Anchor present surfaces of greater extent, parallel to the axis of rotation, and therefore bearing an equal strain, and, consequently, much less likely to give way under any severe trial. The square and rectangular forms are, moreover, better calculated for insuring sound workmanship. To return, however, to the holding qualities, let us again refer to the drawing, but more especially to the section Fig. 13, by which it will be seen that the form of the Improved Palm is widely different from all the forms of Palms hitherto used, for instead of presenting a flat surface at right angles to the resisting medium, the front of the Palm is "bevelled," and thus presents two surfaces obliquely to the line of traction, with one intermediate surface (comparatively small) at right angles thereto; and as any two sides of a triangle are longer than the third, these surfaces present a greater area of resistance than could be obtained by a flat Palm of the same length and breadth.

And, moreover, their centre of resistance is considerably deeper in the ground, which is another decided advantage. In fact, if the lower arms of two anchors of equal weights be buried in the ground up to the middle of their shanks, it will be seen that the broadest part of the Palm of the Improved Anchor is below the point, or termination of the arm of the anchor of the usual construction; and the tendency of the former is to penetrate deeper, whilst that of the latter is to rise out of the ground.

It should also be observed, that when the Improved Anchor is buried up to the middle of the upper arm (and it frequently sinks entirely under the surface), the back of the palm is in contact with the ground, and its rubbing action greatly augments the holding power of the anchor. This may be easily demonstrated by showing that the friction upon the back of the palm is greater than that upon the front, inasmuch as the ground on which it rests has not only to support the weight of the superincumbent ground, which denotes the friction upon the face or front of the palm, but likewise the weight of both arms, together with that of the crown, and a considerable portion of the shank.

It is now proper to advert to a principle which has been as yet only slightly glanced at, for it is, in fact, by its powerful operation that the plan now under review obtains such a manifest superiority over every other anchor hitherto used.

If, for example, a wedge having parallel sides be placed flatwise, at the depth of two or three feet beneath the surface of the ground, its resistance to any impelling force in the direction of its point, whether by traction, or by propulsion, would be in proportion to the superincumbent weight, which would have to be raised up as the wedge advanced. But if the wedge be placed edgewise, at the same depth as before, it will be found that its resistance would be greatly increased by the indefinite extent of the ground laterally, and therefore the wedge could not be moved forward, without compressing the ground on either side of it, to such an extent as to allow the thick end to pass.

This then is precisely the action of the edges of the Improved Palms, when the arm of the anchor is buried to a certain depth in the ground, as represented by Figs. 3 & 12.

The action of the oblique surfaces of the palm, being in the direction of the perpendiculars thereto, is partly lateral and partly vertical, and will be clearly understood by a reference to Figs. 3, 12, & 13; but the palm is always buried to such a depth that its vertical action upon the ground does not produce any perceptible elevation of it at the surface.

It is only necessary here to add, that the holding power of the anchor is greatly augmented by the peculiar shape of the arm, which acts in the same manner as the edges of the palm; for it is obvious that the friction and lateral pressure of the ground against its sides, is much increased by its wedge form; and the friction, and consequent resistance, may be still further increased by making the sides of the arms a little hollow or concave. There is, in fact, in constant action upon the surfaces of the Improved Arms and Palms a sort of concentrated resistance which does not obtain in any other anchor.

The Improved Stock is now to be explained; and its principle of construction, and peculiar advantages, will be perhaps best understood by contrasting it with the stocks now in use.

For large anchors then, the practice at present is, to use a wooden stock, which is doubtless stronger than that of iron, and therefore less liable to be broken. It is likewise better calculated for "canting" the anchor quickly; but then it should be borne in mind that it is liable to be "wormed," and is more subject to deterioration by "wear and tear" than the iron stock. And moreover, its power of holding is very questionable; for it is obvious from its lightness when submersed, and the extended base on which it rests, that it cannot sink much beneath the surface of the ground, and therefore it prevents the arm from penetrating beyond a certain depth, and this depth is limited by the resistance of the ground against the lower part of the shank, which is in a manner suspended by the wooden stock.

For small anchors however the stock is generally made of iron, of a round or oval form, to reeve or pass through a hole in the shank for that purpose.

This arrangement is very convenient for stocking or unstocking the anchor, but it is highly objectionable in regard to holding, and more especially when there are large knobs or balls on the ends of the stock, which however are almost indispensable for facilitating the "canting" of the anchor. But after the anchor is "canted," these balls tend to keep the stock off the ground, over which it passes with but little resistance, and this tendency is further increased by the protuberance on the shank, caused by the formation of the stock-hole.

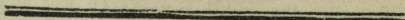
In fact, the entire action of the iron stock in common use very much resembles that of a sledge, which has its front end turned upwards, in order that it may oppose the least resistance to the ground, and slide along as smoothly as possible.

Now, it must always be borne in mind that the intention of an anchor is to obtain the greatest possible amount of resistance compatible with a sufficient degree of strength; and, with this object in view, the sectional form of the Improved Iron Stock is made widely different from any of the forms hitherto used. This will be obvious by reference to Figs. 9 & 10, by which it will be seen that the sections are somewhat of a triangular shape, and consequently the stock is of a prismatic sort of form, having its front thicker than its back part; which form gives it a tendency to sink into the ground when the anchor is dragged; for it will be observed that the stock generally rests on its front edge, and its lower side does not come wholly into contact with the ground, until the crown of the anchor is buried to a considerable depth beneath the surface.

It will therefore be quite evident that if the Improved Stock, by reason of its weight and penetrating tendency, sinks to the depth of one, two, or three feet beneath the surface of the ground, the arm will also penetrate so much deeper. And moreover, this penetrating tendency is increased by the projecting part in the middle of the stock, Fig. 8, which forms a rut or trench for the shank to fall into, and thereby still further augments the holding power of the anchor, as well as that of the stock. The discs at the ends of the stock are to prevent its sinking into the ground in "canting" the anchor, and the holes therein are for the purpose of saving iron, and in order to lessen the obstruction to the sinking of the stock after the anchor is "canted."

By Fig. 18, it will be seen that the palms of the stream and kedge anchors are formed in such a manner as to prevent their hooking the boat's gunwale; and it may be proper to mention that, for the convenience of stocking and unstocking, the stocks are rove through the shanks of the anchor as usual; but with a hole at one end, and a bend and "button" at the other.

Having thus minutely described the properties of the Improved Small-Palmed Anchor, the Patentee confidently trusts that it only requires a fair trial to bring it into general use, and with that view he now submits it to the inspection of the Shipping interests of this great Maritime Country, and respectfully solicits their support and patronage.



TESTIMONIALS.

DEAR SIR,

London, March 15, 1847.

I have the pleasure of bearing testimony to the efficiency of your new Patent Anchors, having put one of them to a severe test on the east end of Margate Sands; when, had it started in the least degree, nothing could have saved the ship from destruction. It is barely 25cwt., including the iron stock, and the ship 565 tons N.M.

I am, respectfully, your obedient Servant,

Lieut. Rodger, R.N.

JOHN LAING, Master of the ship "Wilson."

MY DEAR SIR,

American Packet Ship, "Sir Robert Peel,"

London Docks, October 6, 1847.

I have much satisfaction in being able to report most favourably on the qualities of your improved Patent Small-Palmed Anchor, which you supplied to this ship in February last. Before I cleared the river I had a convincing proof of its quickness in biting and holding on, by its parting, in Long Reach, a new $1\frac{1}{2}$ inch chain, which I had previously considered far above its strength and power of holding.

On our last passage from the Downs to the river we had occasion to come to, blowing hard, in Prince's Channel, and from the lightness of your Anchor, the pilot was of opinion that it would not bring the ship up; nevertheless, I let it go, and to his great surprise it brought her head to wind, with a very short scope of cable.

In fact, I am so much pleased with it, that I shall take every opportunity of recommending it, for I am satisfied that it is the most trustworthy Anchor I have ever used, not even excepting your former Small-Palmed Anchor.

You will doubtless be gratified to know that your new Anchor was much admired at New York for its shape and workmanship; but we who have the handling of it admire it more especially on account of its efficiency, notwithstanding its lightness, compared with the tonnage of the ship. The "Sir Robert Peel" is 1,050 tons new measurement, whilst your Anchor weighs only 28 cwt. 1qr. 18lb., exclusive of your improved iron stock, making it altogether 36 cwt. 3 qrs. 14 lb., which I consider very light for a vessel drawing upwards of 20 feet water. Wishing you every success,

I remain, dear Sir, yours very truly,

Lieut. Wm. Rodger, R.N.

DANIEL CHADWICK.

DEAR SIR,

"Isabella Blyth," Downs, October 24, 1847.

We arrived in the Downs with the "Isabella Blyth" on Friday evening, and on Saturday it blew a hurricane from the W.S.W.; but we rode all fast, with 100 fathoms of chain, while several of the ships drove past us, with two anchors down.

I am of opinion that our anchor has not dragged from the place it first took hold in, so you may rest satisfied that your Improved Anchor will answer very well.

I remain, yours very sincerely,

Lieut. Rodger, R.N.

WM. GRICE, Pilot.

DEAR SIR,

Ship "Isabella Blyth," Spithead, November 1, 1847.

I feel much pleasure in being able to report most favourably on the good qualities of your lately Improved Small-Palmed Anchor, which we have used ever since leaving London. Your anchor was let go off Gravesend, and the chain held on (which we term snubbing her,) but brought up the ship very well; and whilst lying in the Downs, it had a severe trial, for it blew a very heavy gale from the southward and westward, such,

indeed, as I have not witnessed for some time past, during which, however, your anchor did not budge, but held on remarkably well. We gave her cable at intervals as the gale increased, and rode it out with 100 fathoms of chain, whilst ships were driving all around us with two anchors a-head.

I had never seen your anchors in use before, but shall put great faith in them for the future, and shall not forget to speak highly of them to any person who may ask my opinion, and you are at liberty to make use of this letter if you think proper.

The "Isabella Blyth" is 713 tons, and your anchor by which we rode out the gale is only 20 cwt. 2 qrs. 2 lb., and the improved iron stock 5 cwt. 3 qrs. 25 lb. I expect to sail this day for the Mauritius, as the weather now looks very fine.

I remain, dear Sir, yours very truly,

Lieut. Wm. Rodger, R.N.

ISAAC PADDLE, Master.

(From the *Shipping Gazette* of the 29th February, 1848.)

RODGER'S IMPROVED ANCHOR.

We have much pleasure in publishing the following letters from the owner and commander of the ship "John Bright," in favour of Lieutenant Rodger's "Improved Small-Palmed Anchors;" we do so, because we have no doubt of their decided superiority over the anchors of the usual construction. We recently witnessed a series of experiments with Lieut. Rodger's anchors, which exhibited their peculiar penetrating tendency in so striking a manner, as at once to convince us, that the construction of the Improved Anchor is based on mathematical principles, and will therefore bear the strictest examination:—

DEAR SIR,

23, Billiter Street, Feb. 25, 1848.

We have had another test of your Improved Patent Anchors in the "John Bright," and so convinced am I of their superiority over every other shape or form, that when suitable sizes of yours are obtainable, I will use no others.

I am, Sir, yours obediently,

Lieut. Wm. Rodger, R.N.

THOMAS HAMLIN.

DEAR SIR,

11, America Square, London, Feb. 25, 1848.

To the numerous and well-merited testimonials which you have already had from others, I would desire to add mine; and if coupled with them, any thing I can say may prove the means of bringing more fully into notice, and more generally into use, your "Improved" Small-Palmed Anchors, I shall consider myself happy in not only performing a pleasing duty to, but actually benefiting the Shipping interest of our country.

I cannot say more, and I would not say less, than that they are the best and most efficient I have yet met with; and I say this after having tested them well, both in the river Hooghly and at the Sand Heads, in the south-west monsoon; as well as in the Downs, where I rode out a gale of wind at north-east—being the only vessel there for three days.

You know the size of the ship—591 tons; the anchors, including stock, which you supplied us with, were 24 cwt. and 25 cwt.

From their lightness I found them easy to purchase, easy to handle and stow, and light on the ship when stowed.

Their little sharp palm goes into the ground like a pickaxe, and when hove short are easily broken out, and do not come up loaded with mud. Their symmetrical beauty must commend them to any one able to judge, and those who are not, or who are still in doubt, only let them try them.

Wishing you that success which your laudable endeavours to improve this part of naval furniture deserve,

I remain, yours very truly,

Lieut. Wm. Rodger, R.N.

JAMES HAMLIN,
Commander of the ship "John Bright."

H.M.S. "Mastiff,"

Alloa, 27th March, 1848.

DEAR SIR,

It affords me much pleasure to inform you, that your new Anchor is the admiration of all who see it, but more particularly of us who use it.

On all occasions it has done its duty well, and its lightness makes it particularly easy for working.

On the late occasion of our breaking adrift at Otterswick, it was the first to snap the cable with 48 fathoms on it, the ship being in $4\frac{1}{2}$ fathoms water; and in September last (particularly on the 15th) it held us admirably with 52 fathoms in about the same depth, during severe gales dead into Stromness harbour from S.E. to South, bringing with them plenty of sea.

Its tendency to bury itself we witnessed at Otterswick, where we could see the bottom owing to the clearness of the water; the upper arm was just shewing while the whole of the starboard anchor was plain on the bottom.

I cannot say whether it is superior to your former, but I can say that I would not be without it on any account.

Make whatever use you please of this.

Lieut. Wm. Rodger, R.N.

Always yours truly,

A. B. BECHER.

SIR,

Fishing Smack, "Muirhead," Barking, April 17, 1848.

I have had one of your Improved Patent Small-Fluked Anchors in constant use, and have never found it wanting.

There is no mistake about its holding, and in almost any ground; and indeed it answers every expectation.

I am, Sir, your most obedient Servant,

Lieut. Wm. Rodger, R.N.

ALEX. R. MACMASTER, Master and Owner.

DEAR SIR,

Packet Ship "Yorktown," London Docks, April 18, 1848.

I am so much pleased with the qualities of your "Improved Small-Palmed Anchor," that I beg you will make me another of the same weight as the last, viz. 42 cwt, to be ready for me on my return to London next August.

Your obedient Servant,

Lieut. Rodger, R.N.

W. S. SEBOR.

DEAR SIR,

Ship "Pilgrim," Cherbourg, Sept. 22, 1848.

I am sorry that matters of importance have prevented me from answering your letter of the 13th instant, requesting my opinion of the Patent Small-Palmed Anchor, which I purchased from you in January last. I now beg to say it cannot be too highly recommended; and the many testimonials you already have of its trials prevents me from saying more than that, during the voyage of seven months from London to Savannah and Mobile by the Gulf passage, and back to this port, I have used your anchor on many occasions, and found it far superior to any I ever used before.

I am, dear Sir, yours respectfully,

JOHN FLOOD.

Lieut. Rodger, R.N.

DEAR SIR,

1, Lime Street Square, Oct. 28, 1848.

I have much pleasure in handing you the following extract of a letter received yesterday from Captain Robert Freeman, of the ship "British Tar," dated Downs, 26th instant.

"Yesterday we had a very heavy gale from S. to S.W., and I believe every ship in the Downs drove but ourselves; we rode very easy, with ninety fathoms on the larboard bower—most of the other ships had their second anchor down. Having an American ship in our

hawse, I was compelled to hold on the second anchor, fearing she might drift down upon us; fortunately the one held us, which speaks well of Lieut. Rodger's Patent Anchor."

From the above, and other testimonials which I have seen, it is evident your Improved Anchor possesses very superior holding qualities; and if you can only reduce the price, I feel persuaded it will soon come into general use. Wishing you every success,

I remain, yours truly,

Lieut. Rodger, R.N.

JAMES SHEPHERD.

DEAR SIR,

Barque "Marshal Bennett," London Docks, Dec. 19, 1848.

I feel much pleasure in bearing testimony to the good qualities of your Small-Palmed Anchor, which I was fortunate enough to be supplied with, and also to be riding by, in a gale of the 4th instant, in the Downs, when I was fouled by an American ship of 666 tons, who hung athwart my vessel twenty minutes; and though other vessels drove with a long scope, your Anchor held both ships for some time without starting. I am quite sure with the common Anchor we should have driven into considerable danger. Should I ever require an Anchor, I should most certainly give yours the preference, after witnessing its capabilities as to holding, and its handiness in purchasing and stowing. You are quite at liberty to make any use you please of this.

I am, dear Sir, yours respectfully,

Lieut. Rodger, R.N.

ALEX. Mc AUSLAND.

SIR,

16, Portland Street, Dec. 19, 1848.

I have much pleasure in bearing testimony to the efficiency and good qualities of the two Patent Small-Palmed Anchors, which you supplied to the barque "Waterhen," in March last. Having had several opportunities of testing them, I find them to be exceedingly handy; they take hold quick, and retain their hold well. The weight of one is 18 cwt. 0 qr. 1 lb., and that of the other 18 cwt. 1 qr. 23 lb., including the iron stock. Unfortunately, I lost the latter, by parting from a 1½ inch chain in the Downs. I need only add, I can strongly recommend your Patent Anchor.

I am, Sir, your obedient Servant.

Lieut. Rodger, R.N.

WM. L. DODDS.

SIR,

London, Dec. 27, 1848.

It affords me much pleasure in bearing testimony to the superiority of your last improved Anchor over those generally used, having had several opportunities of testing them during my last voyage; more especially upon an occasion when in Orkney it was blowing a heavy gale from S.W., when we rode it out with one anchor and seventy fathoms cable, while other vessels were riding with both anchors down, as also when in Hudson's Bay we held on with forty fathoms, when the other two ships brought both anchors a-head.

I am, Sir, your obedient Servant,

Lieut. Rodger, R.N.

D. HERD,

Commanding H. H. B. Ship, "Prince Rupert."

DEAR SIR,

"Sea Witch," West India Docks, 13th January, 1849.

I have reason to think most favourably of the Anchors you supplied me with in April last. I rode out a hard northerly gale, on the 10th instant, off Margate, with one and eighty fathoms chain, when several vessels drove with two down, obliging some to slip and run for the Downs. I have had much experience in the open roadsteads on the Coast of China, and unhesitatingly prefer your Anchor to any other I have had.

I am, dear Sir, yours faithfully,

Lieut. Rodger, R.N.

H. REYNELL.

DEAR SIR,

London, 31st January, 1849.

I was much pleased with your new Patent Anchor supplied to my ship "Lord Dalhousie," having witnessed its qualities put to a severe test, in bringing her up near Gravesend, where, owing to a crowd of anchored vessels, it was necessary to do so suddenly, though she was then proceeding rapidly down the river over a spring ebb. Your anchor was let go, and seemed to bite immediately. Even before 20 fathoms chain were out, it held fast, notwithstanding the immense strain on the cable, which ran away round the windlass, breaking the deck stopper; and it was well the chain got free to run, as otherwise it or the windlass must have given way. I think an anchor on the old plan, in such hard ground, would not, under the circumstances, have brought the ship up in time to prevent damage. Wishing you the success which you so well deserve for this improvement in the anchor,

I remain, dear Sir, yours truly,

T. O. HARRISON.

Lieut. Wm. Rodger, R.N.

(From the *Shipping Gazette* of the 19th April, 1849.)

RODGER'S IMPROVED ANCHOR.

The following testimonial to the excellent qualities of Lieut. Rodger's Improved Anchor is so much in accordance with the opinions we have expressed, as the result of the practical tests we have witnessed, that we have much pleasure in calling attention to it. It appears that the Surveyor to Lloyd's—Mr. Courtenay— anxious to obtain "a sound practical opinion" as to the merits of Rodger's Small-Palmed Anchor, made application to a respectable Channel Pilot, whose experience of the working of anchors of all kinds and in all weathers cannot be questioned. The testimony which Mr. Pashley offers to the superiority of Rodger's Anchor is no doubt well merited; and we believe that the only bar to its becoming so extensively used as it ought to be is, the additional cost of the article over that of the common anchor. This obstacle, however, may perhaps ultimately be removed, and in that case the Improved Small-Palmed Anchor will, in all probability, come into general use, for there does not appear to be the slightest difference of opinion as to its merits, either theoretically or practically :—

DEAR SIR,

2, White-Lion Court, Cornhill, London, April 10th, 1849.

Being desirous of obtaining an unquestionable opinion in regard to the alleged superiority of your improved Anchor, I applied to Mr. Pashley, a gentleman of sound practical judgment, and one who has had the best opportunities of testing its properties, as he has been in the habit of piloting the American packet-ships from London to Portsmouth, most of which carry your anchors.

I inclose, with his permission, a copy of his letter to me, as it may be satisfactory to you to know what is his real opinion of the merits of your Anchor.

I am, dear Sir, your obedient servant,

Lieut. W. Rodger, R. N.

P. COURTENAY.

DEAR SIR,

Hyde Vale, Greenwich, February 6th, 1849.

I think it only my duty to my brother sailors to offer my humble testimony to the excellent qualities of the Improved Small-Palmed Anchor, just patented by Lieutenant Rodger, R.N.

My constant employment, for many years, in the London and New York line of packets, has convinced me of the first importance of a good anchor, and I think the new one the very best I ever had to ride by. As one proof out of very many I could name, I will mention a trial during the heavy gales last month.

The packet-ship Margaret Evans is supplied with one of Rodger's improved Anchors, of

28 cwt., or including the iron stock, 36 cwt. At four P.M. on the 22nd of January last, I let go this anchor in 10 fathoms water, under Dungeness, and in order to test its holding properties (having plenty of room in case of its coming home, or of parting the chain), I gave her only 60 fathoms of cable (the 60 fathom shackle being abaft the windlass). The ship rode safely, and without driving a foot, until the 26th, during which interval of four days we had a constant succession of heavy gales from S.W. to W.N.W., but had no occasion to give the ship more cable.

I consider this a strong proof of the holding powers of the Anchor, in addition to which, I have invariably found it bring the ship up with more certainty than any other anchor I ever used.

So well satisfied are all the captains in the line of packets with Rodger's Anchors, that they are now supplied to nearly every ship composing it, solely in consequence of their superiority over all other anchors known.

I remain, dear Sir, your very faithful servant,

Captain Courtenay, Surveyor to Lloyd's.

E. PASHLEY.

SIR,

London Docks, 4th May, 1849.

I feel anxious to bear testimony (as others have done) to the excellence of your Patent Small-Palmed Anchor, which I consider far superior to any of the old make, having had frequent opportunities of testing its qualities, but more particularly on my last voyage from London to St. Michael and back, whilst at anchor in the Downs during a heavy gale. I can only say I shall always recommend it.

I am, Sir, yours respectfully,

JAMES HOWARTH,

Lieut. W. Rodger, R.N.

Master of the schooner "Prima Donna."

SIR,

7, Portland Street, Commercial Road, 10th May, 1849.

Having now had several trials of your Anchors in the ships "John Bright," "British Tar," "Lord Dalhousie," and "Hyderabad," and having had opportunities of trying them under various circumstances, more particularly on board the "Lord Dalhousie," in the early part of January last, by having to bring her up suddenly at Gravesend amongst a cloud of colliers, and afterwards riding at the lower part of the Prince's Channel forty-eight hours, in the face of a gale of wind at E.S.E., I think I am quite justified in expressing a most confident opinion in favour of them, and I have no hesitation in saying that I consider them very much superior to any other form of anchor of the present day; and so far as my humble influence extends, I shall lose no opportunity of recommending them. Earnestly wishing that every ship that I may have to "pilot" may be supplied with at least one of your Anchors,

I remain, Sir, your obedient Servant,

Lieut. Rodger, R.N.

WM. HINDHAUGH.

SIR,

Coast Guard Office, 30th June, 1849.

Having called upon the Commanders of the Revenue Cruisers named in the margin* for their opinions upon the result of the trial of Lieut. Rodger's Patent Anchors, I herewith forward you for your information copies of their reports upon the merits and properties of your invention.

I am, Sir, your obedient Servant,

Lieut. Rodger, R.N.

S. SPARSHOTT.

* "Nimble," "Harriet," "Defence," and "Sylvia."

H. M. R. Cruiser "Nimble," Folkstone, 7th June, 1849.

(EXTRACT.) I beg to state that the one I have on board this cruiser has had a fair and full trial, and that I ever found it a good holding anchor in all sorts of bottom, hard ground, mud, or sand, besides which it has a most excellent qualification over all other anchors, viz., there is no possibility of its ever coming unstocked.

To Inspecting Commander, Folkstone.

J. P. BLUNDELL, Commander.

SIR,

"Harriet," R. Cruiser, 13th June, 1849.

(EXTRACT.) I beg to state that, in my opinion, Rodger's Patent Anchor is a strong-made anchor, and appears to be a good holding anchor; as a proof of its holding in one instance, on the 15th December, 1848, when in the North Highlands, and riding a very heavy gale of wind off Tobermorry, a schooner drove down and hooked the chain which was fast to Rodger's Patent Anchor, and brought her up, which enabled her to ride the gale out.

To Inspecting Commander, Largs.

JAMES Mc ALISTER, Commander.

SIR,

"Defence," R. Cruiser, at Sea, June 8th, 1849.

(EXTRACT.) I beg leave to state that this anchor has been in use as a working anchor for the last twelve months, and on several occasions during that time its merits for strength and holding properties have been satisfactorily tested, and whenever a second anchor has been let go, it was more from fear of snapping the chain than riding by, than from a fear of this anchor not holding. I find that it brings the vessel up with the shortest scope of cable, acting in the same way when getting under weigh, by retaining its hold until the cable becomes a short stay peak, then (but not till then) loosing its hold with surprising readiness, which I can only account for as being the result of the peculiar formation of the flukes, and which appeared to me to be at once adapted for every description of ground, without the probability of its getting shoed, for I have frequently noticed when the anchor has been hove up, that scarcely any portion of the ground is to be seen sticking to the palm, however stiff and adhesive the nature of the ground it was in may have been; it therefore comes up lightly, and is easy catted and fished.

The manner in which the stock of this anchor is fitted, is evidently a decided improvement on the old plan of having a hole through the shank, as there is no fear of losing it, unless the anchor is lost, neither is it likely to require any repair, if in use for many years, and should the stock get broken at any time by accident, it can easily be replaced by a wooden one, having squares on the shank for that purpose.

I further beg to say that I am of opinion Rodger's Patent Anchor, from its make and construction, possesses great strength where it is most wanted, combined with lightness and extraordinary holding properties, and only requires a fair trial to satisfy any one of its capabilities.

JOHN Mc CONNOCHY, Commander, "Defence," R.C.

To Inspecting Commander, Coast Guard, Weymouth.

SIR,

"Sylvia," R.C., Mount's Bay, June 9, 1849.

I beg leave to state that during the experience that I have had in this vessel and others, I have found Rodger's Patent Anchor to be the most depending anchor in every respect, that can be used.

T. R. FORWARD, Commander.

To Inspecting Commander, Penzance.

DEAR SIR,

East India Ship "Blenheim," August 24, 1849.

In answer to your note, requesting to have my report on your Improved Small-Palmed Anchor, I must acknowledge that its holding power far exceeded my most sanguine expectation. So far from it being too light for a ship of our burthen (1333 tons), I do not hesitate saying that an anchor of that description, 8 cwt. lighter, would be amply sufficient, under all circumstances, for us.

Off the Reculvers, blowing hard, with much sea on, and hove nearly short, we bent the links of our chain in heaving in, before we could start the anchor. I have had other opportunities of testing it *severely*, and always to my entire satisfaction; viz., in the Hoogly during the freshes, at the Sand-Heads in a sea way, and bringing up short with good way on the ship.

Our anchor, not including the stock, is 38 cwt.

I am, dear Sir, yours faithfully,

Lieut. Wm. Rodger, R.N.

M. C. CLOSE, Commander, Ship "Blenheim."

SIR,

14, Warkworth Terrace, Limehouse, March 1st, 1850.

I have much pleasure in bearing testimony to the good qualifications of your new Small-Palmed Anchor. During the month of February I rode out a heavy gale of wind at S.W. by S. to S.W., in Dungeness Roads, on board the American Packet-ship "Sir Robert Peel," with 80 fathoms of chain only; the other vessels near us having both anchors ahead, many driving, and several parted.

I am your obedient Servant,

Lieut. Rodger, R.N.

GEORGE JAS. THOMPSON, PILOT.

DEAR SIR,

London, June 1st, 1850.

I beg you will furnish the "Robert Small" with another Anchor, of the same size and weight as the one you supplied her with two years ago, and which did the ship much good service.

I remain, your obedient Servant,

Lieut. Rodger, R.N.

THOS. SMALL.

DEAR SIR,

Ship "Denison," off the Magazine, 29th August, 1850.

I am glad to have this early opportunity of bearing testimony to the merits of Lieut. Rodger's Small-Palmed Anchor.

The best Bower you supplied us with has already proved its efficiency.

On the 27th inst., whilst in the River Mersey, on my outward passage to Bombay, it came on to blow so hard from the N.W., that we found it necessary to come to an anchor. I thought this a fair opportunity of testing the power of Rodger's Patent, so let it go, and, to the admiration of the Pilot and myself, it brought us up with only thirty fathoms chain out; and though strong winds and tides have still prevailed, I venture to say she has not dragged a yard.

Wishing you every success in the sale of these valuable Anchors,

I am, dear Sir,

Yours most respectfully,

Wm. Laird, Esq., Liverpool.

WM. KING, Master.

DEAR SIR,

8, Austin Friars, London, May 31st, 1851.

I have much pleasure in bearing testimony to the very superior qualities of your new Patent Anchor, supplied to the ship "Alipore," under my command.

On the 8th of February last we were riding in the Downs, right in the hawse of another ship, distant about 100 yards; and as it was blowing strong, with a lee tide, the Pilot considered it impossible to get under weigh.

We tried it, however, and it held on till we hove in to 15 fathoms, when we made sail and got out clear.

I feel quite certain that the old anchor, with 30 fathoms, would not have held her under the circumstances.

I am, dear Sir,

Yours respectfully,

B. D. FREEMAN.

Lieut. Rodger, R.N.

(From the *Shipping Gazette* of the 18th July, 1851.)

RODGER'S IMPROVED ANCHOR.

We have frequently had occasion to refer to the superior qualities of Lieut. Rodger's Patent Anchors, and we have now much pleasure in directing attention to the following letter from a practical Ship-owner, as further testimony of the correctness of our opinion. Experiments testing the qualities of Rodger's Anchors are daily in operation at the Crystal Palace, which have been witnessed to the satisfaction of our first naval authorities and a number of gentlemen interested in shipping:—

SIR,

8, Austin Friars, London, July 14th, 1851.

Having witnessed the experiments made by you on Saturday last, with your Patent Small-Palmed Anchors, I beg now to repeat my great satisfaction at the results then exhibited, and further to say, that so thoroughly am I convinced of the advantages attendant on the use of your Improved Anchors, and of their efficiency in every respect, that I have determined on having my future vessels fitted with them throughout, instead of having merely a spare Anchor of your Patent for each ship as heretofore; and, with that view, now order three Bower Anchors, one Stream, with one large and one small Kedge, for my next ship, which will be completed in two or three months.

I will again communicate with you, stating the precise weights I shall require.

I am, Sir, yours truly,

W. S. LINDSAY.

Lieut. Wm. Rodger, R.N.,
9, Shawfield Street, King's Road, Chelsea.

SCALE OF ANCHORS AND CHAINS

FOR

VESSELS FROM 10 TO 2000 TONS, OLD MEASUREMENT.

TONNAGE.					Weight of ANCHORS and STOCKS.					Size of Chains.	TONNAGE.					Weight of ANCHORS and STOCKS.					Size of Chains.	TONNAGE.					Weight of ANCHORS and STOCKS.					Size of Chains.	TONNAGE.					Weight of ANCHORS and STOCKS.					Size of Chains.
Tons.	Cwt.	Qrs.	lbs.	Ins.	Tons.	Cwt.	Qrs.	lbs.	Ins.	Tons.	Cwt.	Qrs.	lbs.	Ins.	Tons.	Cwt.	Qrs.	lbs.	Ins.	Tons.	Cwt.	Qrs.	lbs.	Ins.	Tons.	Cwt.	Qrs.	lbs.	Ins.	Tons.	Cwt.	Qrs.	lbs.	Ins.									
10	0	2	17	$\frac{7}{8}$	310	15	0	10	$1\frac{5}{8}$	820	35	2	0	$1\frac{3}{4}$	1420	54	1	17	2	10	1	1	2	$\frac{3}{4}$	20	15	2	4	....	40	36	0	23	....	40	54	3	24	....			
20	1	1	2	$\frac{3}{4}$	20	15	2	4	....	60	36	3	18	....	80	37	2	12	....	60	55	2	1	....	30	15	3	26	....	60	55	2	1	....	60	56	0	7	....			
30	1	3	11	$\frac{1}{2}$	30	15	3	26	....	80	37	2	12	....	900	38	1	5	....	80	56	0	7	....	40	16	1	20	$1\frac{3}{8}$	50	16	3	13	$1\frac{3}{8}$	1500	56	2	12	....			
40	2	1	18	$\frac{1}{4}$	40	16	1	20	....	20	38	3	26	....	20	38	3	26	....	20	57	0	16	$2\frac{1}{8}$	60	17	1	6	....	70	17	2	27	....	20	57	2	20	....			
50	2	3	21	$\frac{1}{8}$	50	16	3	13	$1\frac{3}{8}$	40	39	2	18	$1\frac{1}{2}$	60	40	1	10	....	40	57	2	20	....	80	18	0	20	....	80	58	0	23	....	60	58	2	26	....			
60	3	1	24	$\frac{1}{8}$	60	17	1	6	....	80	41	0	0	....	80	41	0	0	....	80	58	2	26	....	90	18	2	13	....	80	58	2	26	....	80	58	2	26	....			
70	3	3	25	....	70	17	2	27	....	1000	41	2	19	....	1600	59	1	1	....	1600	59	1	1	....	10	19	0	5	$1\frac{7}{8}$	20	19	3	17	....	20	59	3	3	....			
80	4	1	25	$\frac{7}{8}$	80	18	0	20	....	20	42	1	8	....	20	42	1	8	....	20	59	3	3	....	20	6	1	11	1	40	20	3	0	....	40	20	3	0	....			
90	4	3	22	....	90	18	2	13	....	40	42	3	25	....	40	42	3	25	....	40	60	1	5	....	60	21	2	11	....	60	21	2	11	....	60	21	2	11	....			
100	5	1	17	$\frac{1}{2}$	400	19	0	5	$1\frac{7}{8}$	60	43	2	14	$1\frac{7}{8}$	80	44	1	1	....	80	60	3	6	....	80	22	1	20	$1\frac{1}{2}$	80	22	1	20	....	80	61	1	7	....			
10	5	3	15	....	20	19	3	17	....	1100	44	3	16	....	1700	61	3	8	....	1700	61	3	8	....	50	23	1	1	....	500	23	1	1	....	20	24	0	8	....			
20	6	1	11	1	40	20	3	0	....	20	45	2	3	....	20	45	2	3	....	20	62	1	8	....	60	25	2	21	$1\frac{3}{4}$	60	25	2	21	....	40	24	3	15	....			
30	6	3	6	....	60	21	2	11	....	60	46	0	17	....	60	46	0	17	....	60	63	1	7	$2\frac{1}{8}$	60	26	1	26	....	60	26	1	26	....	60	63	3	5	....			
40	7	1	0	....	80	22	1	20	$1\frac{1}{2}$	80	47	1	16	....	80	47	1	16	....	80	63	3	5	....	80	27	1	2	....	80	27	1	2	....	80	64	1	4	....			
50	7	2	22	$1\frac{1}{8}$	500	23	1	1	....	1200	48	0	0	$1\frac{1}{2}$	1800	64	1	2	....	1800	64	1	2	....	10	28	0	6	$1\frac{5}{8}$	20	28	0	6	....	20	64	3	2	....			
60	8	0	18	....	20	24	0	8	....	20	48	2	12	....	20	48	2	12	....	20	64	3	2	....	20	29	3	22	....	40	29	3	9	....	40	65	1	0	....			
70	8	2	14	....	40	24	3	15	....	40	49	0	23	....	40	49	0	23	....	40	65	1	0	....	60	25	2	21	$1\frac{3}{4}$	60	25	2	21	....	60	65	2	25	....			
80	9	0	11	$1\frac{1}{2}$	60	25	2	21	$1\frac{3}{4}$	60	46	3	3	....	60	46	3	3	....	60	63	1	7	$2\frac{1}{8}$	60	26	1	26	....	60	26	1	26	....	60	63	1	7	....			
90	9	2	5	....	80	26	1	26	....	80	47	1	16	....	80	47	1	16	....	80	63	3	5	....	80	27	1	2	....	80	27	1	2	....	80	63	3	5	....			
200	10	0	0	....	600	27	1	2	....	1200	48	0	0	$1\frac{1}{2}$	1800	64	1	2	....	1800	64	1	2	....	10	29	3	9	....	20	29	3	9	....	20	65	1	0	....			
10	10	1	25	....	20	28	0	6	$1\frac{5}{8}$	20	48	2	12	....	20	48	2	12	....	20	64	3	2	....	20	30	1	18	....	40	30	1	18	....	40	65	1	0	....			
20	10	3	22	....	40	28	3	9	....	40	49	0	23	....	40	49	0	23	....	40	65	1	0	....	60	26	1	26	....	60	26	1	26	....	60	66	0	22	....			
30	11	1	18	$1\frac{3}{8}$	60	29	2	11	....	60	49	3	6	....	60	49	3	6	....	60	65	2	25	....	60	27	1	2	....	60	27	1	2	....	60	66	0	22	....			
40	11	3	15	....	80	30	1	12	....	80	50	1	16	....	80	50	1	16	....	80	66	0	22	....	80	28	0	6	$1\frac{1}{4}$	80	28	0	6	....	80	66	0	22	....			
50	12	1	11	....	700	31	0	12	$1\frac{1}{4}$	1300	50	3	26	....	1300	50	3	26	....	1300	50	3	26	....	10	30	1	9	....	20	30	1	9	....	20	67	2	11	....			
60	12	3	6	$1\frac{1}{4}$	20	31	3	12	....	20	51	2	7	....	20	51	2	7	....	20	67	2	11	....	60	32	2	11	....	60	32	2	11	....	60	68	0	6	....			
70	13	1	2	....	40	32	2	11	....	40	52	0	16	2	40	52	0	16	2	40	67	2	11	....	80	33	1	9	....	80	33	1	9	....	80	68	0	6	....			
80	13	2	25	....	60	33	1	9	....	60	52	2	24	....	60	52	2	24	....	60	68	0	6	....	80	34	0	7	....	80	34	0	7	....	80	68	2	1	....			
90	14	0	20	....	80	34	0	7	....	80	53	1	3	....	80	53	1	3	....	80	68	2	1	....	80	34	3	4	....	800	34	3	4	....	800	68	3	24	....			
300	14	2	15	$1\frac{5}{8}$	800	34	3	4	....	1400	53	3	11	....	1400	53	3	11	....	1400	53	3	11	....	2000	68	3	24	....	2000	68	3	24	....	2000	68	3	24	....			

The above Table is the result of considerable experience, and shows the weights of Lieut. RODGER'S Improved Patent Small-Palmed Anchors, (Improved Iron Stocks included,) for Vessels of every description in the Merchant Service.

Also the sizes of Chains suitable, which are regularly proportioned to the strength of their respective Anchors.

The weights of the Improved Stream and Kedge Anchors (Stocks included) are to the weights of the above Bower Anchors, in the following proportions: viz. Stream Anchor, one-third; Large Kedge, one-sixth; and Small Kedge, one-ninth. For Vessels above 500 tons, an additional Kedge of about half the weight of the latter, will be found useful.

London, June, 1850.

WM. RODGER.

Extract from Lloyd's Register of British and Foreign Shipping, (Page 23).

SEC. 72.—All Vessels under 200 tons, to have at least two Bower Anchors; and all Vessels of 200 tons and above, to be provided with at least three Bower Anchors.

Tons.		Tons.		Fathoms.	
SEC. 73.—All Vessels		under 150		to have at least 150 of Chain.	
"	"	of 150 and under	250	"	180
"	"	of 250	"	"	200
"	"	of 350	"	"	240
"	"	of 500	"	"	270
"	"	of 700 and upwards	"	"	300

JOHN SHAW,

GLOSSOP, MANCHESTER,

INVENTOR AND PATENTEE

OF THE

INDIA RUBBER AIR GUN.

Exhibited in the Great Exhibition of 1851, No. 254, Class VIII.

This Gun has no separate air pump, reservoir, nor valve, the requisite pressure of air for one discharge being procured instantly at the pull of the trigger by one stroke of a piston, actuated by a previously extended India Rubber Spring.

Its Discharges—which are fully equal in power to those of the common Air Gun—are uniform in strength and can be made with great precision, facility, and safety.

It can also (owing to the extreme simplicity of its mechanism,) be furnished in similar styles of work and material at half the price of the ordinary Air Gun, either as a most delightful toy for the youthful marksman, at all prices from a few shillings; or as a handsome and efficient Rook and Rabbit Rifle, with implements, and with or without case, in material and style of work, according to price from 5 to 10 guineas

(Turn over.)

SHAW'S PATENT INDIA-RUBBER AIR GUN.

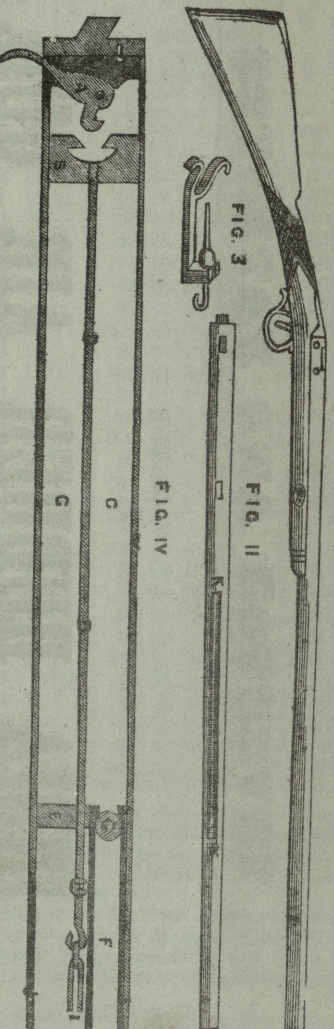
THIS INVENTION, which presents a singular combination of the elastic powers of vulcanised India-rubber and air, has been invented and patented by Mr. John Shaw, of Glossop, musical instrument-maker. It will doubtless be gladly welcomed by the lovers of ball-shooting, as enabling them to enjoy their favourite diversion at a fractional part of its former cost. Without any previous pumping, the requisite pressure of air for one discharge is procured instantly at the pull of

FIG. I

FIG. II

FIG. III

FIG. IV



piston-rod and barrel, with a portion of the india-rubber hereinafter described, and in the state in which they appear after one discharge, and prior to preparation for another. Fig. IV, represents, on a larger scale, a longitudinal section of about one half of the breech end of the Gun unstocked: A is the trigger; the piston; c c, the inside of the pump barrel or condensing syringe; d, the piston-rod; e, the pump top, perforated in the centre for the piston-rod to work through, and at the top edge for the reception of the end of the shot barrel; f, the shot barrel, held in its present situation by a slight contraction of that end of the india-rubber spring, attached to the hooked end of the piston-rod, and similarly attached by its other end to a hook in the handle of the muzzle-end of case; j j are portions of the case, enclosing the shot barrel. The lower shaded part being one end of, or the slot in the muzzle-end of case; Fig. IV, shows the Gun in act of discharge; the (K K, Fig. IV.) The section, Fig. IV, shows the Gun in act of discharge; the

trigger being just pulled, releases the piston, which, by the reactive power of the India-rubber spring, rushes to the opposite end of the syringe, condensing the air therein, and which condensed air, or any elastic fluid, is then forced into the shot barrel. To prepare the Gun for discharge, the ball, if the barrel be a rifled one, must first be rammed down: an adapted hook must then be introduced into the slot (K K), between the head (H, Fig. IV) and the hooked end of the piston-rod, as plainly indicated by Fig. III. The hooked end of the Gun must then be placed against the top part of the thigh, and the back pulled with both hands, in the direction of the breech, until the trigger, by the pull of the small spring at its back, catches the piston. With a smooth or unrifled shot barrel, no discharges per hour can be made; the barrel in that case, requiring no ramming down, the shot barrel by the partial vacuum caused by drawing down the piston. The spring consists of from sixteen to eighteen India-rubber bands.

A NEW AIR-GUN.—We were forcibly reminded the other day of some lines in one of Byron's poems, beginning
"This is the patent age of new inventions
For killing bodies," &c.

by the inspection of a new and very ingenious air-gun, which if it does not possess the formidable power of the new Russian *Zemudel-gesch*, which kills people in a perfectly satisfactory manner at the distance of seven or eight hundred yards, is still, in point of cheapness, simplicity and efficiency, greatly superior to the common air-gun. It is the invention of Mr. John Shaw, musical instrument maker, of Glossop, who is, we believe, favourably known as the author of one, or two important improvements in wind instruments. The great singularity of the new air-gun consists in the entire absence of air-pump, reservoir, and valves, which, in the common air-gun, are attended by no small amount of trouble, and some personal danger. The air which expands the ball is powerfully compressed, at the moment of discharge, by a piston acting within a cylinder, and moved with great force and rapidity by the sudden contraction of a spring composed of a number of vulcanised india-rubber rings previously extended by hand with a force quite equal to that exerted in the common air-gun, and with this great advantage, too, in addition to those always the same; whilst, in the common air-gun, it diminishes with every discharge from the reservoir, requiring the very ingenious adaptation of the great elastic force of vulcanised india-rubber, of which so much use has been made of late.—From the *Manchester Guardian*.

SHAW'S PATENT INDIA RUBBER AIR-GUN.—We have lately seen a specimen, and also the effect, of this singular combination of the elastic powers of vulcanised India rubber and air, invented and patented by Mr. John Shaw, of Glossop, musical instrument maker. It will doubtless be gladly welcomed by the lovers of ball shooting, as enabling them to enjoy their favourite diversion at a fractional part of its former cost. Without any previous pumping, the requisite pressure of air for one discharge is procured instantly at the pull of the trigger, by a single stroke of a condensing syringe, actuated by a previously extended india-rubber spring. There is no separate pump, no reservoir of condensed air, nor valve of any kind. The whole apparatus is enclosed in a case, which, being stocked, has the appearance of a very light and elegant fowling-piece without a lock. This invention possesses several advantages over the ordinary air-gun, one of which is its superior safety, owing to the absence of a large reservoir of highly-condensed air, and to the extreme simplicity of its mechanism. The discharges from the india-rubber gun—which are fully as strong as the average ones from the ordinary air-gun—have the advantage of being of perfectly uniform strengths. With these desirable peculiarities, combined with its extraordinary cheapness, the great facility, and trifling expense attending its use, we have no doubt that this invention will speedily supersede the ordinary air-gun and cap-rifle for rook and rabbit shootings, and the powder rifle for garden and gallery practice.

The *Manchester Examiner and Times*.

DESCRIPTION OF SPECIMENS

OF

Gun Engraving and Enlaying

WITH GOLD, SILVER, &c.

PRODUCED BY

JOHN SHORMAN,

Engraver and Enlayer of Guns, Pistols, &c.

No. 6, GREAT PULTENEY STREET,

GOLDEN SQUARE, LONDON,

*On view at the Exhibition of the Works of Industry of
all Nations, 1851,*

HYDE PARK.

~~~~~  
CLASS 8.....No. 266.  
~~~~~

London:

PRINTED BY JOHN SHORMAN, 196, PICCADILLY; AND
6, GREAT PULTENEY STREET.

1851.

German text letters, a border and corners inlaid ; this it is thought will show a sufficient variety of work : also a single false breech inlaid with gold.

BROOCHES, Manufactured, Designed and Inlaid, by the Exhibitor in various styles, showing the adaptation of Inlaying for ornamenting fancy articles of iron or steel, cutlery, &c.

A Steel-blue Brooch, inlaid with gold and silver intertwined, and having an ornamental cypher in the centre.

A Steel-blue Brooch of a different design, inlaid with gold, and having a space left for initials.

A browned Brooch of a fuller design, inlaid with gold.

In other parts of the case are impressions on paper, from inscriptions in the Persian language, several of which have been inlaid for various Gun Makers at different times ; an impression on metallic paper, from one of a pair of Pistol barrels, and some from other parts of the same Pistols, designed and executed some months since ; and impressions from the breech-end and fore-end of a Double rifle barrel, the design for which was made in such a manner, that, without destroying its boldness, the edges of the squares should not be broken through by the inlaying. Impressions from other articles inlaid, are also presented to notice.

A great variety of designs and impressions from Inlaying and Engraving, may be seen at the EXHIBITOR'S RESIDENCE, No. 6, Great Pulteney Street, Golden Square, London.

ESTABLISHED 1796.

GUN-LOCKS, &c. CARVED IN THE FOREIGN STYLE.

tion for another. Fig. IV. represents, on a larger scale, a longitudinal section of about one half of the breech end of the Gun uncocked : A is the trigger ; B, the piston ; C O, the inside of the pump barrel or condensing syringe ; D, the piston-rod ; E, the pump top, perforated in the centre for the piston-rod to work through, and at the top edge for the reception of the end of the shot barrel. F is the ball, held in its present situation by a slight contraction of that end of the shot barrel. I is one end of the India-rubber spring, attached to the hooked end of the piston-rod, and similarly attached by its other end to a hook in the inside of the muzzle-end of case ; J J are portions of the case, enclosing the

India-rubber spring, rushes to the opposite end of the syringe, condensing the air therein, and which condensed air forcibly ejects the ball. To prepare the Gun for discharge, the ball, if the barrel be a rifled one, must first be rammed down : an adapted hook must then be introduced into the slot (K L), between the head (H, Fig. IV.) and the hooked end of the piston-rod, as plainly indicated by Fig. III. The butt-end of the Gun must then be placed in the top part of the dial, and the hook pulled with both hands, in the direction of the breech, until the trigger, by means of the small spring at its back, catches the piston. With a smooth or unrifled barrel, 400 discharges per hour can be made : the ball in that case requiring no ramming. It being drawn

TO PRESERVE LIFE IN SHIPWRECK.

LAURIE'S PATENT FLOATABLE MATTRESSES

(NOT INFLATED),

PILLOWS, LIFE BELTS,
AND SUNDRY BUOYANT ARTICLES.

S. W. SILVER & CO.

SOLE LICENSEES.

Every Ship Mattress will sustain Eight Persons in the Water for an indefinite period, and at a small increase on the usual cost of those in common use. Every Pillow or Seat-Cushion will sustain one or more persons. The LIFE BELTS are Preventives to sinking, the cheapest yet submitted, very portable, and applied in an instant in case of accident. Thus, every Sailing Vessel, Steamer, Yacht, Boat, or craft of any kind, and every person on board, ought to be furnished with these clever Sinking-Preventives, which may be seen and tested at the Manufacturers,

S. W. SILVER & CO.

CLOTHIERS, OUTFITTERS, AND CONTRACTORS,

66 & 67, CORNHILL,

AND

4, BISHOPSGATE STREET, LONDON;

AND AT LIVERPOOL.

Where Passengers may be supplied with the whole or any portion of their Outfit without sacrificing the too usual intermediate profit, SILVER & Co. being the Makers of the Manifold Articles in the Outfit, and supplying them at their Shipping Prices, including

Folding Furniture for Cabin use on the Voyage,

WHICH IS SO CONTRIVED AS TO FORM A SUPPLY ON ARRIVAL.

DEPARTMENT FOR OUTFITTING CADETS, CLERGYMEN, AND CABIN PASSENGERS
GENERALLY.

Naval and Military Uniforms, and Clothing for Home use, at 66 & 67, CORNHILL.

DEPARTMENT FOR OUTFITTING LADIES,

And for Home Use, with experienced Female Managers, 66 & 67, CORNHILL.

DEPARTMENT FOR VERY LOW-PRICED OUTFITS, 4, BISHOPSGATE STREET,

OPPOSITE THE LONDON TAVERN,

Where a comfortable fit-out for a Four Months' Voyage may be procured for Four Guineas, including a Sinking-Preventive Mattress.

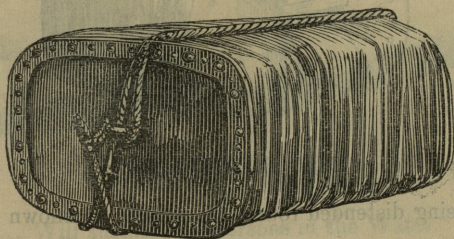
DRAFTS ON AUSTRALIA, 30 DAYS' SIGHT, AT PAR.

LAURIE'S PATENT FLOATING APPARATUS.



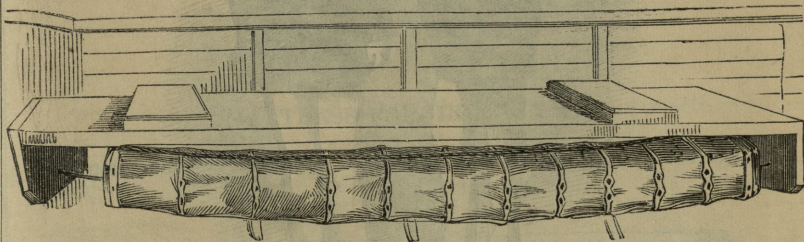
end of the piston-rod, and similarly attached by its other end to a hook in the back, catches the piston. With a smooth or unridged barrel, 400 discharges per hour can be made; the bullet in that case requiring no ramming; it being drawn

No. 1.

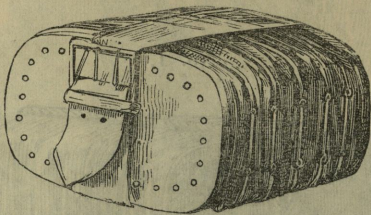


CANVASS BOAT-FLOAT.

Which distended under the seat of Boat, as shown below,
will prevent the possibility of the Boat sinking.

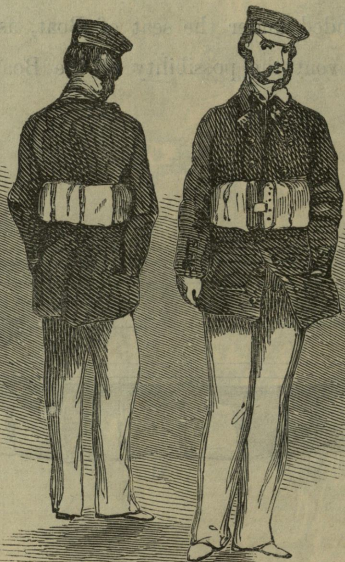


No. 2.



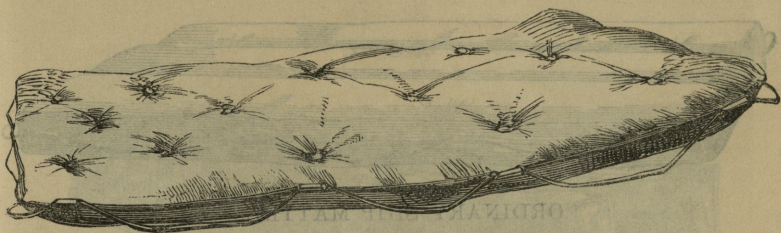
DISC BODY-FLOAT.

Which being distended round the person, as shown in sketch below, becomes a preventive to sinking in the water, and is applied in an instant.



inside of the muzzle-end of case; & & are portions of the case, enclosing the
 back, catches the piston. With a smooth or un rifled barrel, 400 discharges per
 hour can be made; the bullet in that case, requiring no ramming, it being drawn

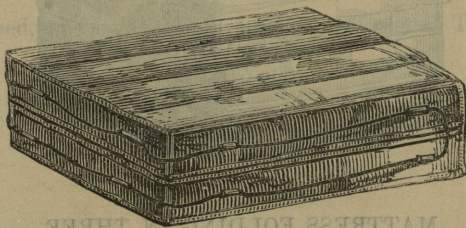
No. 100.



EMIGRANT'S MATTRESS.

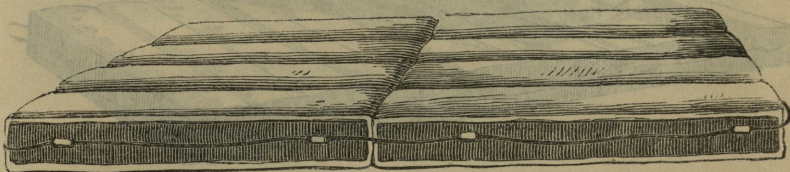
Will sustain Six Persons in the Water.

No. 208.

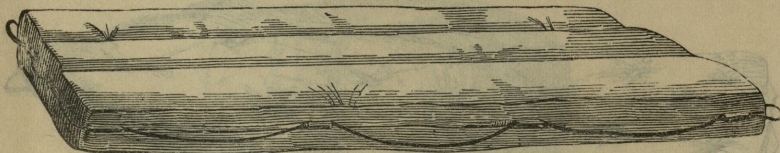


MATTRESS FOLDING IN TWO.

For convenience of carriage. Will sustain Ten Persons in the Water.



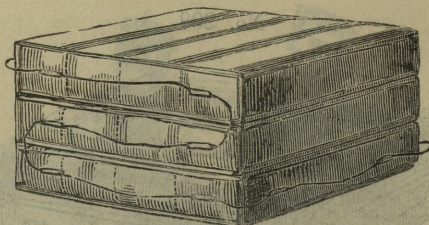
No. 104.



ORDINARY SHIP MATTRESS.

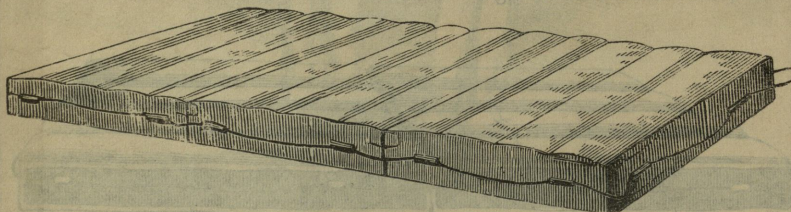
Will sustain Ten Persons in the Water for an indefinite period.

No. 212.



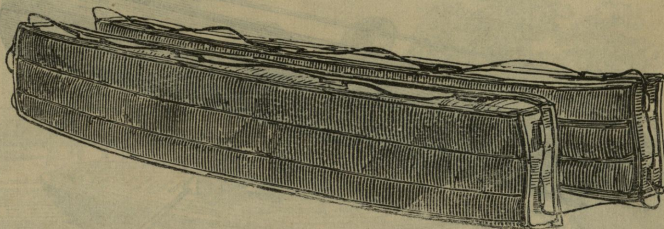
MATTRESS FOLDING IN THREE.

For Military purposes, and will sustain Ten Persons in the Water.



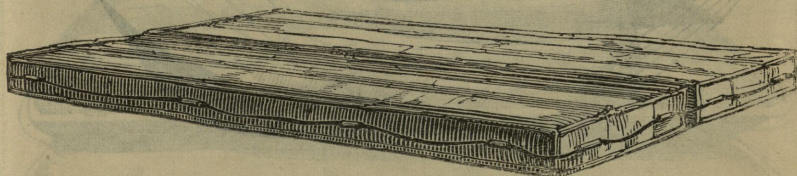
inside of the muzzle-end of case; 3 are portions of the case, enclosing the back, catches the piston. With a smooth or rifled barrel, 400 discharges per hour can be made; the bullet in that case requiring no ramming, it being drawn

No. 250.

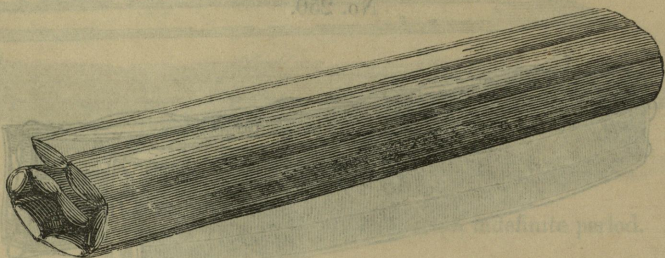


MATTRESS DIVIDING LONGITUDINALLY.

When opened, as shown in Figure below, will sustain Ten Persons
in the Water.



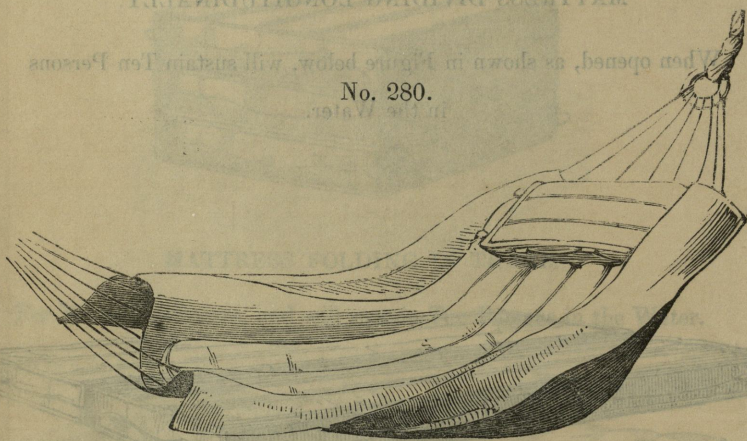
No. 270.



HAMMOCK-BED, WHICH ROLLS UP.

Will sustain Eight Persons in the Water.

No. 280.



HAMMOCK AND BED IN ONE.

Will sustain Six Persons in the Water.

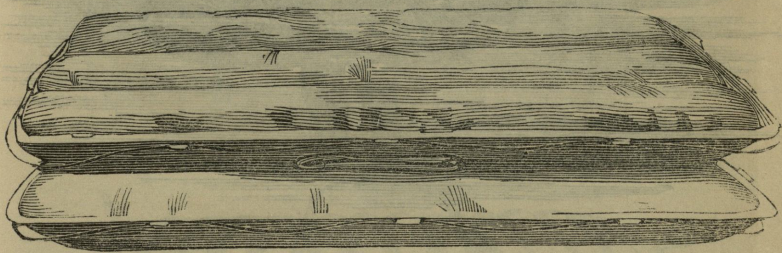
inside of the muzzle-end of case; j j are portions of the case, enclosing the
 hour can be made; the bullet in that case requiring no ramming, it being drawn

No. 300.



BOAT MATTRESS.

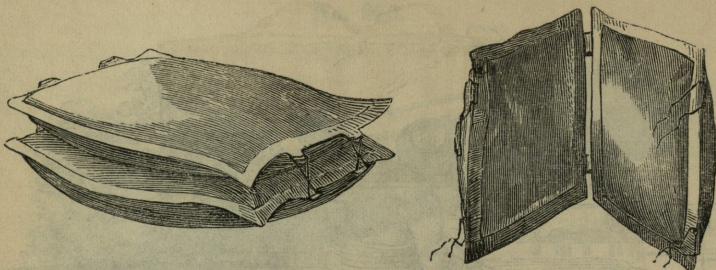
As used for preserving life, forming a Double Mattress for sleeping on, as shown below; and will sustain Twenty Persons in the Water.



BOAT MATTRESS.

As used to sleep upon.

No. 402.



DOUBLE PILLOW.

Which when opened and placed round the body will sustain
Six Persons in the Water.

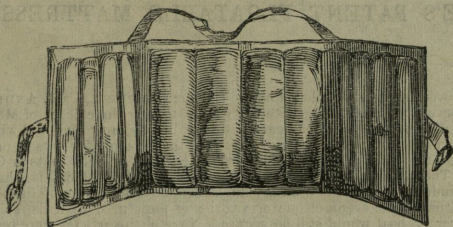
No. 600.



PORTMANTEAU.

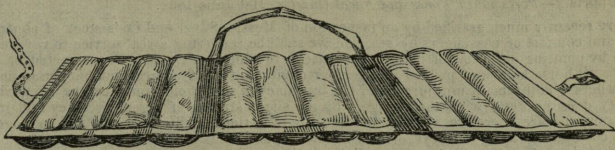
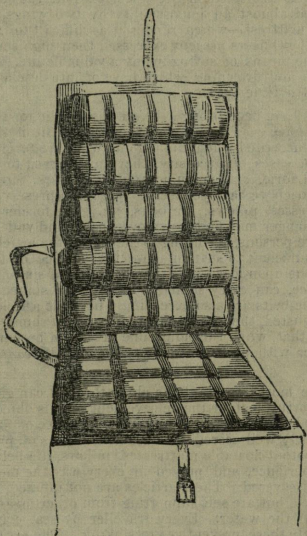
Forming a Life Preserver.

Nos. 502 & 503.



DECK SEAT CUSHIONS.

Which become Life Preservers by being placed round the body
(see figure below), and may be applied in an instant.



OPINIONS OF THE PRESS

LAURIE'S PATENT FLOATABLE MATTRESSES, &c.

"Some experiments were made at Woolwich before Colonel CAMPBELL, Capt. ANDERSON, Capt. FADDY, Lieut. ROWLEY, and several other Officers, with the view of testing the efficacy of Messrs. SILVER & Co.'s appliances, as Patented by LAURIE, for preventing loss of life by drowning, and which are to be seen in the Exhibition. The principal of these consist of Belts for the person, of Floats to prevent the sinking of boats, and of Floatable Articles of deck and cabin requisites, such as Deck Seats or Cushions, Mattresses, and a Portmanteau. The distinguishing feature of the Belt and Boat Float is, that, consistently with portability, it is a cylinder of stout but ordinary duck, extended over disks of light wood which divide it into compartments, so that in the event of one or two being punctured by nails, splinters, or otherwise, the safety of the wearer or boat would still be secure. None of the articles were tested to the utmost of their buoyancy, notwithstanding which, one boat-float buoyed up weights to the amount of 98 lb. The Cabin Mattress, 6 feet by 2 feet, formed of 12 compartments, not purposely inflated, but stuffed so as to prevent the escape of air or the percolation of water easily floated 182 lb., sufficient to support a number of persons, if wrecked, for an indefinite time. A Mattress, consisting of four compartments, buoyed up 98 lb.; a Horse-hair Pillow, 28 lb.; a small Deck Seat or Cushion, 14 lb. Great interest was excited by one of the assistants of Messrs. SILVER, of Cornhill, getting into a Portmanteau, which, though of the ordinary size, is one fitted up so as to allow of the bottom shifting, and the legs, protected by Mackintosh, protruding, with a similar protection enclosing the waist. In this novel boat the exhibitor floated about at his ease. A Boat Mattress was also tested, and elicited the surprise and admiration of the company present. It consists of two thin mattresses, joined together so as to form a canoe or boat. One of the assistants, and subsequently Captain FADDY, entered, and, seating himself in the pocket, disported in the water without the least tendency of the vessel capsizing, which, indeed, is rendered almost an impossibility by two wings, or weather boards—if we may apply the term to portions of a mattress—which render it as difficult for the boat mattress to capsize as a steamer with paddle-boxes. The Officers present expressed their high sense of the utility of these inventions, which will, it is hoped, be the means of saving many a valuable life, and diminishing the number of those fatal accidents, by wrecks and drowning, which have of late desolated families and harrowed up the feelings of the public."—*Sun*, 14th June 1851.

"Of the many inventions which during the last few years have been brought before the public for the purpose of preserving life in cases of shipwreck, few indeed have even approached the attainment of the desired object; and, although some have to a certain extent succeeded when undergoing what are termed the popular tests, still when they have been resorted to in cases of necessity, they have proved to be entirely useless. An invention recently patented by a Mr. Laurie, and manufactured by Messrs. Silver and Co., Outfitters, of Cornhill, appears to be the nearest approach we have yet seen to a real life-preserver. The invention is exceedingly simple, and is made into mattresses, pillows, life belts, &c. The former of these articles are necessary in every vessel, and in times of danger may be thrown overboard, and will be found sufficiently buoyant to sustain the weight of one or more persons, according to the size of the article: for instance—a single pillow, or cushion of ordinary size, is sufficient to sustain above the surface of the water one man, and a ship mattress will float with eight persons upon it without the possibility of sinking; consequently every vessel, without the slightest inconvenience, can carry sufficient buoyant substance to keep above water as many persons as a ship can carry. The life-belts are also exceedingly portable articles, and can be adjusted to the body instantly, and, when once adjusted, the wearer must, in spite of himself, float on the surface of the water. We have very little doubt that, when this admirable invention becomes generally known, but few persons will venture on the water without them."—*Shipping and Mercantile Gazette*, May 30, 1851.

"The subject of preserving life in shipwreck is one of the most important the philanthropist can give his attention to. The Duke of Northumberland, with praiseworthy zeal for the achievement of this object, has offered a reward of one hundred guineas for the best model of a life-boat, and in the absence of any adjudication of the handsome prize, we may point to an already well-accredited efficacious means of preserving life from the stormy billows, we allude to Laurie's patent floatable mattresses, pillows, life-belts, and other buoyant articles, which have stood the test of experience, and proved in every way the most reliable source for the dependence of travellers by sea yet discovered. These articles are not inflated, as are the majority of the inventions professing to save life at sea, but are self-supporting from other means. A small mattress will support as many as eight persons on the water. Every traveller by sea, every craft carrying crew or passengers, ought to be furnished with these preventives to sinking. The article may be seen and tested at the extensive outfitting manufactories of Silver and Co., London, Liverpool, and other great ports."—*Portsmouth Times and Naval Gazette*, 21st June 1851.

"We were recently much gratified by an inspection of Messrs. Silver and Co.'s stock of contrivances for the safety and comfort of passengers by sea, and we shall be rendering a real service to voyagers of every description by pointing out a few of them. The articles to which we allude are constructed of waterproof cloth filled with horse-hair, and padded into compartments, so that if an accident happen to one compartment the others would remain uninjured, and the buoyancy of the whole would not be affected. Their utility does not end with the voyage. By no slight stretch of ingenuity, they fold in the most portable forms, and are, therefore, superior to most others in their facilities for overland carriage. On this account, in colonial exploring journeys, or on lengthened marches as in India, they are invaluable, excluding alike heat and damp."—*Australian and New Zealand Gazette*, 14th June 1851.

GREAT EXHIBITION
OF THE WORKS OF INDUSTRY OF ALL NATIONS, 1861.
CLASS VIII.

THE
TWIN-STERN STEAMER,

WITH A

Protected Propeller.

CORRECTED EDITION.

WITH AN APPENDIX,

DESCRIPTIVE OF THE

BALSA LIFE BOAT.

BY ALFRED B. STURDEE, N.A.

TRAIL, CHASE & CO. ITHFIELD,
Hotel.
PATENT SAIL LOF.

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alike hea

THE
TWIN-STERN STEAMER,

WITH A
PROTECTED PROPELLER;

Being an Enunciation of the contemplated Advantages

OF A

NEW FORM OF HULL

FOR

PROPULSION OF THE SCREW,

OR OTHER

SUB-MARINE PROPELLER,

PROPOSED IN 1845.

CORRECTED EDITION.

WITH AN APPENDIX

DESCRIPTIVE OF THE

BALSA LIFE BOAT.

By ALFRED B. STURDEE, N.A.

Royal Dock Yard, Westwick.

London:

PRINTED BY JAMES THRESCOTT, NELSON SQUARE.

1851.

TRAIL, CHASE ITHFIELD,
Hotel.
PATENT SAIL LOF.

inside of the muzzle-end of case; & & are portions of the case, enclosing the hour can be made; the bullet in that case requiring no ramming, it being drawn

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TWIN-STERN STEAMER

PROTECTED PROPELLER
Being an illustration of the anti-vibration propeller

NEW FORM OF HULL
PROTECTION OF THE SCREW

NEW MARINE PROPELLER
PROPOSED IN 1883

CORRECTED EDITION
WITH AN APPENDIX

DEVELOPED BY THE
RASEA LIFE BOAT
PATENTED IN 1883

THE NEW FORM OF HULL
THE NEW MARINE PROPELLER
THE NEW FORM OF HULL

THE
TWIN-STERN STEAMER,

WITH A
PROTECTED PROPELLER;

Being an Enunciation of the contemplated Advantages

OF A
NEW FORM OF HULL

FOR
PROPULSION OF THE SCREW,

OR OTHER
SUB-MARINE PROPELLER,

PROPOSED IN 1848.

CORRECTED EDITION.

WITH AN APPENDIX

DESCRIPTIVE OF THE

BALSA LIFE BOAT.

By ALFRED B. STURDEE, N.A.

Royal Dock Yard, Woolwich.

London:

PRINTED BY JAMES TRUSCOTT, NELSON SQUARE.

1851.

TRAIL, CHASE & CO. WILMINGTON, DEL.
PATENT SAIL LOU.

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TWIN-STEERN STEAMER.

PROTECTED PROPELLER.

THE RIGHT HONORABLE
SIR JAMES CLARKE, BART.

THE MARQUESS OF ORMONDE, K.P.

NEW FORM OF WHEEL.

PROPOSITION OF THE SCREW.

PROPOSED MACHINE PROPELLER.

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STEWART AND MURRAY, OLD BAILEY.

TO

THE RIGHT HONORABLE

THE MARQUIS OF ORMONDE, K.P.,

&c, &c. &c.

As a mark of the Inventor's grateful recollection of his Lordship's kind and earnest endeavours to secure the adoption of the proposed improvements, and promote the interest of the Projector during his absence on Foreign Service, in 1848, and as a slight tribute of respect to his Lordship, for the great interest taken by him in the general advancement of Naval Science, this Pamphlet, enunciating the contemplated advantages of the Twin-Stern Steamer, with a Protected Propeller, is most respectfully dedicated,

BY HIS LORDSHIP'S MOST OBLIGED

AND HUMBLE SERVANT,

ALFRED B. STURDEE.

WOOLWICH, 9th June, 1851.

TRAIL, CHASE & CO. WILMINGTON, DEL.
PATENT SAIL LOF.

PREFACE

THE RIGHT HONORABLE

THE MARQUIS OF ORMOND, &c.

Having felt convinced of the immense advantages to be derived from the screw, or a similar sub-marine Propeller, at the first moment of witnessing its effect on board the "Albatross" steamer, in 1839, I received great pleasure from viewing every part of that vessel, with several other gentlemen from the Royal Dock Yard, Mr. Smith, the inventor, who had been attached to Portsmouth by the launch of H.M.S. "Queen," of 116 guns, being on board at the time, I was enabled, through the courtesy and attention of that gentleman, to make a working Model, descriptive of the applica-

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PREFACE.

Having felt convinced of the immense advantages to be derived from the Screw, or a similar sub-marine Propeller, at the first moment of witnessing its effect on board the "Archimedes" steamer, in Portsmouth Harbour, in 1839, I received great pleasure from viewing every part of that vessel, with several other gentlemen from the Royal Dock Yard. Mr. Smith, the inventor, who had been attracted to Portsmouth by the launch of H.M.S. "Queen," of 116 guns, being on board at the time, I was enabled, through the courtesy and attention of that gentleman, to make a working Model, descriptive of the applica-

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PATENT SAIL LOU.

tion of the Screw as then fitted in the "Archimedes." This model was the means of explaining the mode adopted for propulsion of vessels by the screw to many of the numerous naval officers and scientific gentlemen resident in and around Portsmouth and the Isle of Wight, most of whom had never before understood the manner of its application.

Having been prompted by the kindness and encouragement of the Admiral Commander-in-Chief and Rear-Admiral Superintendent of the Royal Dock Yard, in which I had then the honour of serving, with their numerous scientific friends and acquaintance, to give my earnest attention to the removal of the then and now universally accepted disadvantage of removing the principal portion of the dead wood, which dangerous practice is absolutely ne-

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cessary for the application of the screw in the ordinary style of fitting it, I proposed and had the honour of exhibiting, through the medium of the lamented late Vice-Admiral the Honourable D. P. Bouverie, to the Lords Commissioners of the Admiralty, a working Model of a Steamer having two Propellers, one under either quarter of the vessel. By this means the introduction of the much complained of vulnerable point of an ordinary screw steamer was avoided, and the after part of the ship was preserved entire.

Experience, however, having since proved that no advantage arises from a second Screw, this plan has been considered some time obsolete; but undiminished exertion and study enabled me, in 1848, when serving in H. M. Naval Yard at Bermuda, to make, and forward to England a Model illustrating

TRAIL, CHASE

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WITFIELD,
Hotel.

a mode of construction, by which the entire removal of the disadvantages complained of, and the introduction of many improvements are confidently anticipated. An enunciation of the contemplated advantages constitutes the subject of this pamphlet, put forth in the earnest faith that a generous public will not fail to award that attention and support to the novel construction now before them, which the subject demands at the hands of a people, whose lives and properties are daily and hourly committed, in increasing numbers and value, to the sea-worthy qualities of Screw Steamers.

A. B. S.

Woolwich, 9th June, 1851.

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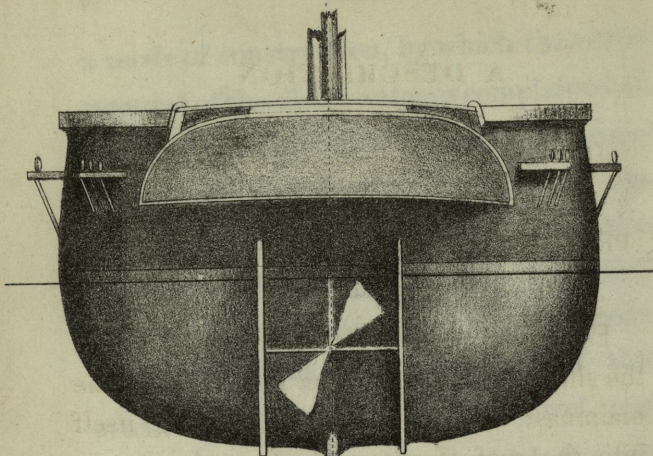
a mode of construction by which the entire
 removal of the diseased organs is accomplished
 and the introduction of new organs
 is accomplished by the same method. An
 examination of the contemplated operation
 constitutes the subject of this pamphlet
 put forth in the earnest hope that some
 one public will not fail to award their
 attention and support to the novel con-
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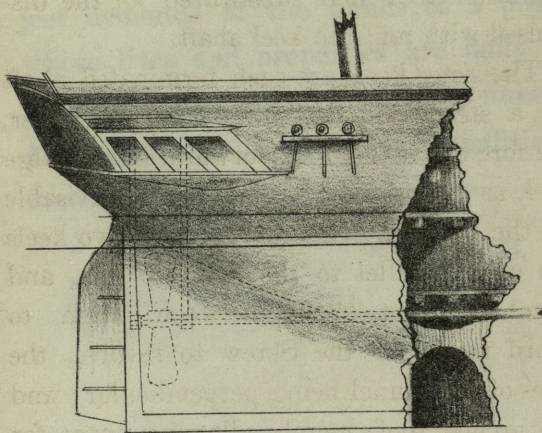
London, Dec. 1851.

TRAIL, CHASE & CO. WILMINGTON, DEL.
 HOTEL.
 PATENT SAIL LOF

STURDEE'S TWIN STERN STEAM SHIP.
WITH PROTECTED PROPELLER, AS PROPOSED IN 1848.



A SECTIONAL VIEW OF A SHIP FOR MAIL, MERCANTILE OR WAR SERVICE.



A PROFILE VIEW OF A SHIP FOR MAIL OR MERCANTILE SERVICE.

A. B. Service, del.

J. Truscott, lith.

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A DESCRIPTION
OF THE
TWIN-STERN STEAMER,
WITH
PROTECTED PROPELLER AS PROPOSED.

For ocean traffic, the ordinary shape of the ship is preserved from the stem to the mainmast, the keel gradually losing itself into the roof of a tunnel, formed between two sister keels here substituted for the dispensed with midship keel abaft.

The sister keels are each terminated abaft by a stern post, carrying a twin rudder, the fore end extending forward like a bilge keel, as far as may be considered advisable for the strength of the ship. The two keels are each parallel to the midship one, and have sufficient space between them to afford room for the Screw to revolve, the sides of the tunnel being perpendicular; and the arched roof, merely allowing space for

TRAIL, CHASE & CO. WILMINGTON, DEL.
PATENT SAIL LOF

the revolution of the Propeller, gradually descends from the fore side of it, and makes a fair line with the main keel, immediately under the mainmast.

The ship may be formed of either iron or wood.

The engines are to be placed and fitted in the ordinary way.

For river traffic it is proposed to use iron for economy.

The river Screw Boat will differ from the ordinary shape in the same manner as the ocean Ship; but it is proposed that her beam shall be very much increased, rendering her as shallow as the working of the Screw shaft will admit of, the keels being of sufficient depth to protect the Screw when passing over a hawser, &c., or on grounding the boat, to clean her bottom.

The additional beam will enable a very commodious saloon to be constructed before and abaft the engine, with a promenade on the roof, and a sufficient walk around outside for the use of passengers and crew.

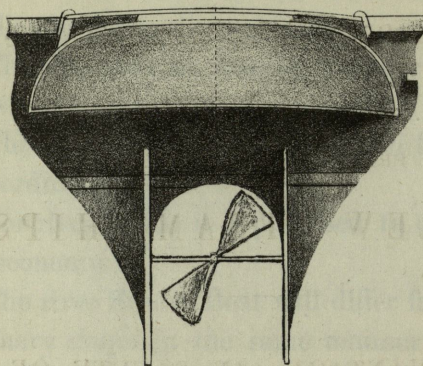
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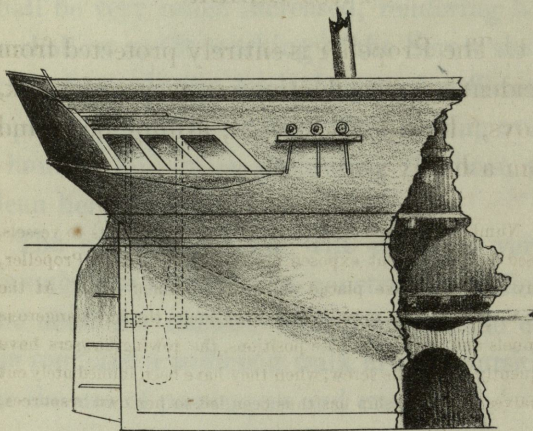
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STURDEE'S TWIN STERN STEAM SHIP.
WITH PROTECTED PROPELLER, AS PROPOSED IN 1848.



A SECTIONAL VIEW OF A SHIP FOR MAIL, MERCANTILE OR WAR SERVICE.



A PROFILE VIEW OF A SHIP FOR MAIL OR MERCANTILE SERVICE.

A. B. Sturdee, del.

J. Braswell, lith.

THE PRINCIPAL ADVANTAGES

ANTICIPATED OVER THE

PRESENT MODE OF FITTING

SCREW STEAM-SHIPS.

ADVANTAGES IN SAFETY OF PROPELLER.

1. The Propeller is entirely protected from accident by shot, floating ice, pieces of wreck, buoys,* hawsers, sea-weed, fishing nets, and from a heavy sea.

* Numberless instances can be proved of accidents to vessels, caused by the present exposed position of the Screw Propeller, many of which have placed ships in imminent peril. At the time they have been towed by screw steamers through dangerous channels and out of intricate positions, the towing hawsers have frequently fouled the screw, when they have been immediately cut in halves; and the ship has thus been left to her own resources,

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Hotel.

2. Expense of wear and tear of Propeller is reduced.

3. In the case of the ship being driven on shore, the greater portion of the dead wood may be knocked away without injury to the Propeller; whereas, in the present mode of fitting screws to steam ships, the first two or three shocks would render the ship unmanageable, upon getting off again, both under steam and canvas, with the loss of Rudder and Propeller, as in the case of a corvette, on the North American coast, in 1850. It is also said of the "Great Britain," that, immediately after the first shock she received on going on shore, the screw was jammed or locked, thereby

while the steamer was occupied disentangling her screw from the hawsers wound around it, which in many cases cannot be effectually cleared till she is placed on shore or in a dry dock. Boats and buoys have at times been sunk after being drawn into the aperture and chains have been dragged around the shaft, much to the risk of the Propeller, often carrying away or bending one of the blades.

preventing any hope of assistance from her engine of 1,000 horse power, which was thereby rendered useless at the time it was perhaps most required for the safety of the ship.

4. Had the iron screw steam-vessel "Helena Sloman" which foundered off New York a few months since, been fitted on the Twin-Stern principle, the lives and property which were sacrificed on that occasion might have been saved. In this case a heavy sea having washed away the rudder and removed the only protection to the propeller, caused it to become a weapon of destruction to the ill-fated vessel, and nearly all on board.

5. The certainty of perfect protection to the Propeller in vessels fitted on this principle, would prove of the greatest advantage for expeditions to the North Pole in search of our missing countrymen, comprising the Expedition under Sir John Franklin.

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ADVANTAGES IN SPEED & POWER.

SPEED INCREASED.

1. The fluid thrown off laterally by the propeller being reflected by the tunnel, vents itself aft with considerable force, like the stream of a rotatory pump, and acting against the after draught of the vessel, which flows in the opposite direction, assists in propelling the vessel; while, in the ordinary construction, the power expended in driving the fluid laterally, is wholly lost.

2. However much the form of the screw may be perfected, the fluid thrown off laterally must always be considerable at starting.

It will therefore be seen that the first revolutions of the screw will be much more effective in the Twin-Stern Steamer than in vessels of the ordinary construction, and a

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great advantage be thus gained in extricating the ship from difficult situations.

3. A more direct flood, and more free passage for the water to the propeller, the line of current being direct with the axis of the propeller.

4. Experience having shewn that the screw even in its present position is superior to the paddle wheel, the proposed plan, promising as it does increased power, with perfect protection from accident by hawsers, is highly recommended for steam tug vessels.

TRAIL, CHASE

PATENT SAIL LOF.

WILTHFIELD,
Hotel.

ADVANTAGES IN THE CONSTRUCTION OF THE HULL.

1. The stern-frame of the ship is very much stronger than even that of an ordinary sailing vessel, has additional displacement, and dispenses entirely with ponderous overhanging quarters.
2. The stern post is not, as now, nearly severed by an enormous hole being bored, through it and the sternson knee, for the screw shaft.
3. Greater stability is obtained, and the heavy rolling so much complained of in the present screw ships very much reduced.
4. Vibration of stern, when under steam, is almost entirely removed.
5. The twin rudder, which can be worked by a single tiller, acts with increased effect; but in cases of accident to one, the remaining one will be found efficient for ordinary work, thereby enabling the carpenter's crew to effect

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a proper repair of the injured one, or fit a temporary rudder to the sister stern post. A single rudder can, however, be adopted, if preferred.

6. On a foreign station, or in the absence of a dock or slip, the ship may be grounded abaft to effect any slight repairs to the propeller shaft, &c.

7. Should the additional expense be considered advisable or necessary, a sliding watertight bulkhead, or penstock, could be fitted abaft the propeller, when, by means of a force pump, the water could be removed from the tunnel or channel, thereby enabling any repairs or surveys to be held on the shaft as if in a diving-bell.

8. When in dock the bilges of the ship are better supported by the sister keels extending under the engines and boilers, the ponderous weight of which at present in many instances cause them to settle before the usual supports can be fixed under the vessel.

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PATENT SAIL LOF.

ADVANTAGES UNDER CANVAS.

1. The propeller can be housed without incommoding the working of the ship or guns.

2. The lateral resistance is increased on the inclination of the ship, by the leeward keel having more immersion than when the ship is upright, thereby adding to her weatherly qualities.

3. The form of the water sections being preserved before each rudder, they have more power than that of the present screw ships, where the water from the leeward side of the vessel passes through the cavity for the screw to the weather side of the rudder.

4. In the case of the ship getting on shore or striking abaft, and having an inclination or list at the time, by tacking or wearing, as the case may require, she will immediately

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be brought upright, and in many instances free herself, when in that position, as her draught of water abaft will then be less than at the moment she struck; whereas the reverse is the case with the present sailing and steam-ships, and, consequently, there is little doubt but that similar attempts to extricate them from the same difficulty are often terminated with serious consequences.

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TRAIL, CHASE & CO. WILMINGTON, DEL.
 PATENT SAIL LOF

ADVANTAGES FOR PURPOSES OF WAR.

1. The propeller, and well for raising it when under canvas, can be fitted clear of the pivot gun, both when housed and in action.
2. The additional strength and support to the stern-frame, already alluded to, and the absence of quarters overhanging by many yards the section of load displacement, as in the case of the ordinary Screw Ships, render the stern capable of sustaining much heavier metal, and which can be better handled or worked from the increased dimensions of the after part of the quarter-deck.

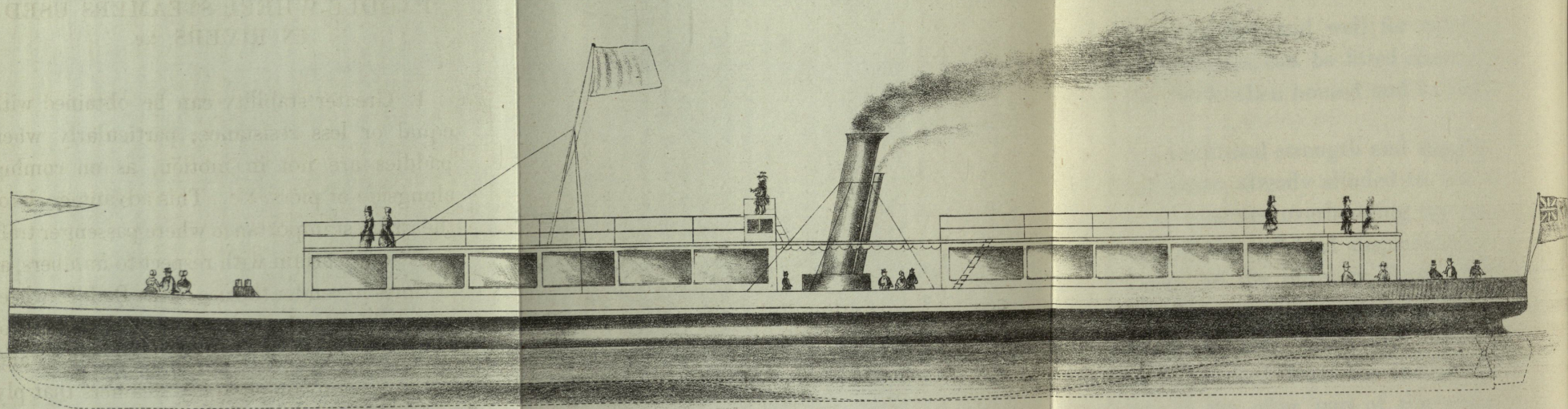
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TRAIL, CHASE ITHFIELD,
Hotel.
PATENT SAIL LOE.



AN IRON RIVER STEAMER,

AS PROPOSED BY A. B. STURDEE, N. A.

A. B. Sturdee del.

J. Truett, lith.

THE PRINCIPAL ADVANTAGES ANTICIPATED
OVER

PADDLE-WHEEL STEAMERS USED
IN RIVERS, &c.

1. Greater stability can be obtained with equal or less resistance, particularly when paddles are not in motion, as on coming alongside of piers, &c. This advantage is of the greatest importance where passenger traffic is so uncertain with respect to numbers, as at times to render the use of the Paddle-wheel vessels highly dangerous; as in the case of the penny boats between the bridges, and the excursion and holiday steamers that ply on the Thames and other rivers.

2. Less expenses for wear, tear, and construction.

3. Increased and better accommodation for passengers, both for embarkation and de-

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Hotel.

barkation, as well as during their voyage, the saloon being above deck.

4. The effect of the Propeller will not be diminished by any amount of immersion; while in the case of paddle-wheels, a very crowded deck load, &c., may even render their revolution impossible.

5. The Propeller will not be affected, when the paddle-wheels would be rendered almost useless by the inclination of the vessel.

6. Perfect stability on taking the ground, the keels acting as a tripod when the tide leaves the vessel.

7. It is impossible for any of the numerous hawsers, warps, &c., always to be met with in rivers and harbours, to get entangled with, or foul, the screw.

8. In a word, the Twin-stern Steam Boat possesses all the advantages of a Twin-steamer without any of its disadvantages.

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ARGUMENTS MEETING OBJECTIONS THAT MAY
BE RAISED TO

CONSTRUCTION OF HULL.

1. It having been proved by experiments made in 1850, that a medium diameter screw was more efficacious than one of large diameter, the tunnel or channel is not necessarily rendered too wide to prevent due symmetry of form in construction.

A large diameter screw can be fitted without materially affecting the symmetry of hull.

2. The slight additional cost of building will be more than compensated by the reduced expense of wear and tear, hire of Dry Dock to effect slight repairs, and the numerous other advantages over the ordinary plan

TRAIL, CHASE & CO. ITHFIELD,
Hotel.
PATENT SAIL LOF.

3. The stowage of the ship is not necessarily reduced, but when required as for mercantile purposes, may be even increased.

ALFRED B. STURDEE.

Woolwich, 9th June, 1851.

N.B. The Model, which was prepared in Bermuda by the Inventor in 1848, to illustrate the preceding advantages, &c. of the Twin-Stern Steamer with a Protected Propeller, fitted with the necessary machinery to exemplify its action in the water, may be seen at the Great Exhibition, in Class V., Area B. 32. For official description, see Catalogue, Class VIII. 337, Provisionally registered.

The present Edition has been prepared with an Appendix, descriptive of the Balsa Life Boat, constructed on the Twin-Stern principle, to meet the request of the Executive Committee of the Great Exhibition, conveyed by their Circular of 30th August, 1851.

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CHELTEMHAM COLLEGE,

16TH JUNE, 1851.

DEAR SIR,

Having seen your model of a Twin-Stern Steamer with a Protected Propeller, and perused your account of the advantages to be anticipated from this mode of construction, I feel confident that there is no theoretical objection to its adoption, and that the Propeller in such a situation would act more effectively, than when placed in the dead wood, as has hitherto been the custom.

I am,

Dear Sir,

Sincerely yours,

J. F. HEATHER, M.A.

Mathematical Master,

Royal Military Academy at Woolwich.

A. B. STURDEE, Esq.

TRAIL, CHASE & CO. WILMINGTON, DEL.
PATENT SAIL LOF.

H.M.S. "PHENIX," WOOLWICH,
AUGUST 15TH, 1851.

MY DEAR SIR,

I HAVE been much pleased by the Diagram and description of your Twin-Stern Screw Ship, with Protected Propeller. It appears to present several advantages over the present form of screw fitting.

The strength of the stern is not so much cut up and destroyed as in the present arrangement, nor is a vessel so liable in taking the ground aft to disable her screw by lifting the outer bearing which at present a very small blow would do. The main advantage gained, however, in my opinion, is the non-liability to suck in every thing floating near it, such as canvas, rope, spars, or even large kelp, which must and does choke the screw, and cannot be readily cut away, as in a paddle vessel, from its protection. This is a primary point, for I conceive the chief duty of steamers in war will be to pick up the lame ducks; and where will you find such a lot of wreck and rubbish as under disabled ships' bows in action. To prove how readily the screw sucks in every thing around it, I will mention what occurred here a few days back:—Being about to set a topmast studding-sail with a fresh breeze, I directed a boom-brace to be got on the boom as a preventer, and when about to sway the studding-

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sail from the deck, to the surprise of every one the fore yard-arm broke short off just outside the brace-strop; this proved that our preventer (which being a long whip we did not wish to cut) had been let go in the gangway by Mr. Nobody, and towing from the studding-sail boom end, had been sucked in, and (luckily coming in contact with the sharp edges of the fan) had been cut short before it did further mischief, or I fear the yard would have been pulled out of her, as it was a stout rope. I think your vessel will lay on the ground and stand well upright, and will not be liable to strain the screw-shaft; and I should be inclined to think that in canals and navigable rivers it would not cause such a wash on the banks, or such mischief to passing boats and barges.

Wishing you a fair field and no favour,

Believe me to be,

Yours very truly,

THOMAS H. LYSAGHT,

Commander H.M.S. "Phoenix."

A. B. STURDEE, Esq.

*H. M. S. Phoenix is a screw steam ship of war of 809 tons,
260 horse power*

TRAIL, CHASE & CO. WILMINGTON, DEL.
PATENT SAIL LOFT

APPENDIX.

DESCRIPTION

OF THE PROPOSED

BALSA LIFE BOAT.

THE principles upon which the Balsa Life Boat have been constructed are those of the twin-stern steamer, with a protected propeller, by the same inventor (see Official Descriptive and Illustrated Catalogue of the Works of Industry of All Nations, Class VIII., No. 337), so applied as to ensure all the qualities recommended by the Committee appointed to examine the plans which competed for the Northumberland Premium.

The term "BALSA," is taken from the name of the boats of South America, famed for their qualities as surf boats, &c., the inventor's attention having been called to the great similarity of his boat to their form. The boats so styled, are each propelled by one man,

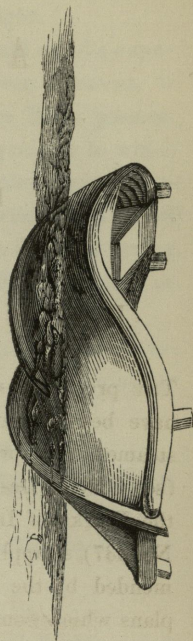
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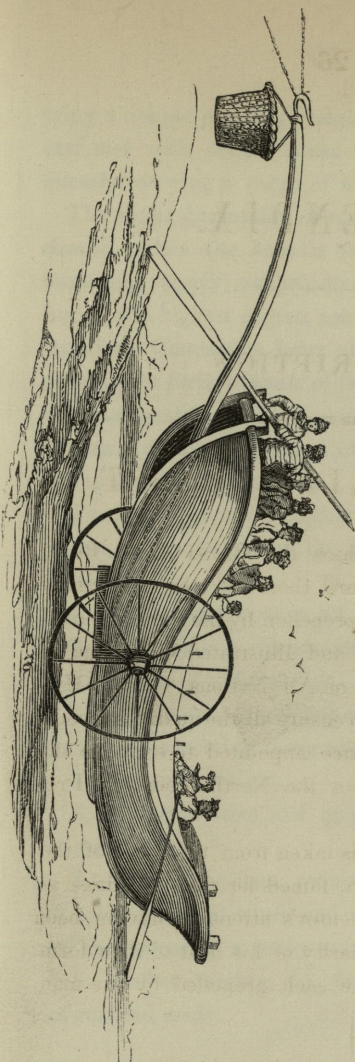
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STURDEE'S BALSA LIFE BOAT.



BOW VIEW.



MODE OF LAUNCHING THROUGH A HEAVY SURF—THE BOAT FLOATING OFF THE WEIGHTED CARRIAGE, WITH HER CREW ON BOARD, IMMEDIATELY SHE BECOMES APPROPRIATELY INFERRED.

TRAIL, CHASE & CO. ITHFIELD,
Hotel.
PATENT SAIL LOF.

and a double point through the heavy breakers and
and then with on the coast of South America. The
recently carrying a cargo of a ton weight.

The small dimensions of speed should may be expe-
rienced when the boat is pulled across the water. It is
not an easily witnessed by the lake possess-
ing in the highest of the numerous qualities in which
the small boats are distinguished from the larger ones.
The small boats are the property of the proprietors of the
small boats, and are used in the small boats, having
apparently been constructed of so light a nature as
not to be a great burden.

The small boats are used in the small boats, having
apparently been constructed of so light a nature as
not to be a great burden.

As a matter of fact in all weather
the small boats are used in the small boats, having
apparently been constructed of so light a nature as
not to be a great burden.

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using a double paddle, through the heavy breakers and surf met with on the coast of South America, frequently carrying a cargo of a ton weight.

The slight diminution of speed, should any be experienced, when the boat is pulled stern foremost, is more than amply compensated by the Balsa possessing, in the highest degree, numerous qualities to which the above Committee have attached the greatest importance in their estimate of the proportionate values of essential qualities, that of pulling stern foremost having apparently been considered of so trifling a nature, as not to require a proportion.

The qualities most highly esteemed by the Committee, and possessed by the Balsa in great perfection are—

1. As a rowing boat in all weathers.
2. As a sea boat, for stability, safety, and buoyancy.
3. Power of self-righting.
4. Suitableness for lifting and launching in a heavy surf, or transporting along shore.
5. Moderate weight.
6. Access to stem and quarters, and double access to stern.
7. As a sailing boat, requiring little ballast, capable of holding a good wind, and not liable to be knocked off her course by a heavy sea on the weather bow.
8. Perfect stability, &c., for beaching with a cargo of rescued souls.

9. Means of freeing boat of water readily.
10. Extra buoyancy, its nature, and mode of application.
11. Room for, and power of carrying passengers.

The "BALSA," as a *Paddle Box Boat*, possesses great advantages over the present form, for laying out anchors, landing heavy ordnance, &c.

One of the various positions in which the "BALSA" is seen in the Great Exhibition (Class VIII, 357, Area K. 1), is that of under sail, illustrating the inventor's improved mode of fitting sheers instead of the ordinary mast, proved by himself during two years' actual use, to afford great advantages for speed, safety, armament, economy of space, burden, and general efficiency for watering ships.

Peculiar advantages are offered in Boats or a Steam Launch, constructed on the Balsa principle, with its very light portable carriage, for transport over the tracts of ice, &c. in the Polar Regions, for the use of exploring parties in search of Sir John Franklin's Expedition.

LONDON :

Printed by James Truscott, Nelson Square.

TRAIL, CHASE & CO. WILMINGTON, DEL.
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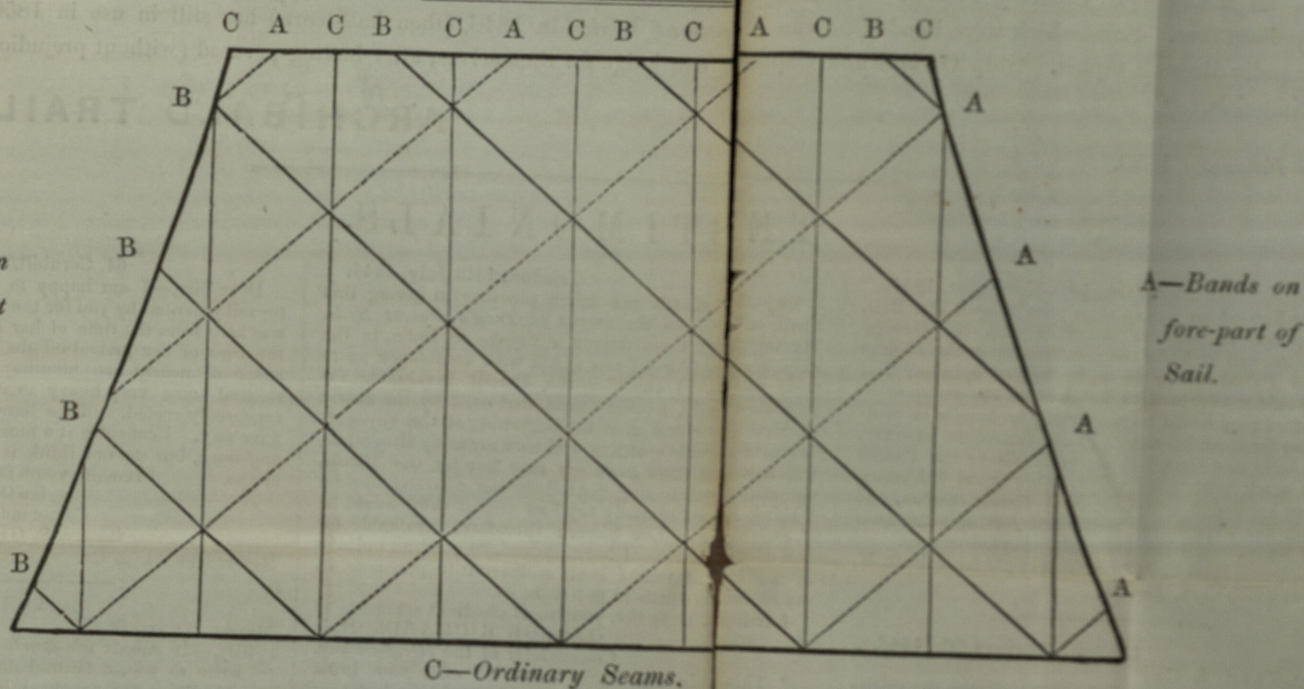
BY ROYAL LETTERS PATENT.



TRAIL'S
STORM

PATENT
SAILS.

The above represents the "TRAVELLER," Captain Finlay, completing her Seventh Outward Voyage to Cadiz, within the Year 1845, aided by TRAIL'S STORM SAILS.



SEVERAL THOUSAND SHIPS HAVE ALREADY BEEN FITTED.

The FOLLOWING SCALE will, at once, show the IMMENSE SAVING to SHIP OWNERS, CAPTAINS, and others interested in Shipping, by the Application of TRAIL'S PATENT to Half-worn Sails.

SAILS.		Number of yds. of Bands applied.	Additional Weight.	Cost of Application, 3½d. per yard.			COST OF NEW SAILS.			
		Yards.	lbs.	£.	s.	d.	per yard.	£.	s.	d.
Foretopmast Staysail	Foot, 8 cloths	72	4½	1	1	0	1/6	3	15	0
Foretopmast Staysail	Foot, 10 cloths	108	6½	1	11	6	1/6	5	12	6
Jib	Foot, 12 cloths	170	10½	2	9	7	1/4½	8	5	0
Jib	13 cloths	190	11½	2	15	5	1/4½	9	12	0
Foresail	{ Head, 23 cloths } { Foot, 23 ditto }	Depth, 8 yards . 262	16	3	16	5	1/6	17	8	0
Topsail	{ Head, 15 cloths } { Foot, 21 ditto }	Depth, 7 yards . 190	12	2	15	5	1/5½	12	10	10
Topsail	{ Head, 16 cloths } { Foot, 23 ditto }	Depth, 10 yards . 280	17½	4	1	8	1/5½	18	9	2
Trysail	{ Head, 12 cloths } { Foot, 17 ditto }	Leech, 11½ yds. } Mast, 8 ditto . } 240	15	3	10	0	1/5½	12	5	0
Schooner's Boom Mainsail	{ Head, 15 cloths } { Foot, 22 ditto }	Leech, 14 yds. } Mast, 10 ditto . } 390	24	5	13	9	1/6	19	7	0

GOVERNMENT CRUISERS

The GOVERNMENT CRUISERS have had the Corded Bands in use for the last Two Years, and have given excellent reports, which we cannot publish, but may be seen at the OFFICE of

TRAIL, CHASEMORE, & COMPANY, (No. 8, UPPER EAST SMITHFIELD, Near St. Katherine's Hotel.)
PATENT SAIL LOFTS,—MILLER'S WHARF, LOWER EAST SMITHFIELD

ADDRESS.

To the Owners and Commanders of Ships of the United Kingdom of Great Britain and Ireland, the United States of America, and the *Nautical and Commercial World* generally, the following Testimonials, relative to *Trail's Patent*, are most respectfully submitted, with the hope that they may prove the means of fully convincing all connected with Shipping, of the great utility to be experienced by the adoption of the *Corded Bands to half-worn sails*. Our objects being to extend the Patent,—to protect life and property,—and thereby save the *Owner's Money*,—to prevent the necessity of extensive repairs, and to secure sails in boisterous weather from *total destruction*, by giving them *diagonal strength*.

It may be well, here, to point out how much more strength is afforded by Bands being placed diagonally, (or in a reversed angular direction,) than by those placed horizontally or perpendicularly, which will readily be admitted by every Nautical Man who has had experience in such matters, from the fact, that every stitch taken, in applying a perpendicular or horizontal Band, falls on the same thread, whereas, in the application of the diagonal Band, it falls on a fresh thread at every stitch; consequently, in lieu of causing the strain to fall on one part of the sail, it is equally distributed over all parts, making every thread in *waft and warp* to bear its own strain. It must be evident to the *Owner* that a ship about to proceed on a long voyage generally has a great call for sails. Now, to simplify this subject, suppose a ship, of 500 tons, about to start on an Eastern voyage at the fall of the season, having on board four *Topsails*, or two whole suits in nearly a *half-worn state*, would it not be deemed necessary, in such a case, to have two more new *Topsails*, or, perhaps, a new suit of courses, *Topsail and Jib*, which would amount, at the lowest estimate, to about £.150; whereas, one of the said suits, if banded, would carry the vessel out and home, to and from Calcutta or Sydney, without any additional expense; (See Captain Cass's, also, Ralph Yorton's report) and this has been experienced by several other ships. To effect all this protection, it would only take about £.25, instead of an outlay of £.150, at the same time a much greater degree of security is given to the sails.

A few words to *Coasting Vessels*.—The *Leith Clippers* have used the Patent from the first sail, (which was made for the *Swift*), to the present time. Sails which were banded for the *Prince of Wales*, in 1846, (then half-worn) are still in use in 1850.—See Captain Alexander Brown's report. Ship Owners and Captains can judge for themselves, after having perused (without prejudice) the following Testimonials.

February 1850.

ARCHIBALD TRAIL, & CO

TESTIMONIALS.

Brighton, 19th November, 1844.

Dear Sir,—After having seen your friend, Mr. Bell, I happened to have an interview with Sir George Cockburn, and we had a conversation upon the subject of your *Patent Sails*; we were then of opinion, that they would answer well to be used as *storm-stay sails*, but feared they would be too heavy to handle in ordinary use for the other sails. The testimonials, however, that I have now seen, incline me to believe the Patent would work with good effect either upon half-worn sails, or applied to something of a *lighter canvass*, and I think the experiment well worth having a fair trial in our Navy. I am, Dear Sir, yours sincerely,

W. SKIPSEY, Admiral, R. N.
To ARCHD. TRAIL, Esq.

London, February 6th, 1845.

Messrs. TRAIL & Co.,

Gentlemen,—I have this last voyage seen the utility of the Bands very sensibly: for during my passage from London to New York, in the month of November last, being in the long, of, say 20 W., I had the wind from the north-west, and very squally weather, when the foot rope of my jib, during a long winter night, (but at what time I cannot say, as I was not aware of it until the next morning,) parted, and had it not been for the Bands, must have gone to pieces, as the sail was very old; and, in fact, so much so, that I had condemned it as not worth repairing. After the foot rope parted, the Band nearest took the strain, and the main canvass rent, say two or three inches, and stopped; and after the weather moderated, and I had given the sail a fair trial, I unbent it and bent another, and am now happy to hand you the two cloths, which were partially split, as a specimen, which I think will prove, without doubt, its utility, and I hope may be the means of advancing your valuable Patent. The rent did not pass the band, although it appears on looking at the piece as having done so. The rent has been made much larger by persons (while the specimens were in my hand) trying the strength of the canvass. With regard to the weight additional to a sail, I am certain that it does not increase in a ratio of more than 10lbs. to every hundred yards of canvass, which I think will banish all objections on that score. With regard to the expense, I can speak from experience, that it has been of great saving, for had it not been for the introduction of this Patent to me, I should have ordered new sails, which would have been at least three quarters more expensive. And now, Gentlemen, wishing you every success that you wish yourselves in this valuable invention for the good of sailors

I remain, most respectfully yours,
H. R. HOVEY,
Captain of the *Westminster*.

P.S.—I send you two *Topsails* and a *Mainsail* to Patent, which I hope will be done in the best possible manner.

"Ship *Switzerland*," 29th March, 1845.

Messrs. TRAIL, CHASEMORE, & Co.,

Gentlemen,—I am happy to inform you, that my expectations regarding the merits of your Patent have been fully realised, as I am about to cross the Atlantic for the fifth time with the old Sails, (without any additional expense) which were patented by you in August 1844; wishing you every success in your progress. I remain, Gentlemen, &c., &c.,
E. KNIGHT.

London, 14th July, 1845.

Sir,—It affords me much pleasure in giving this testimony as to the merits of *Trail's Patent Sails*. Having tried them during a voyage to India, in the ship *Herefordshire*, I can speak with confidence as to their utility. I consider the Patent invaluable for half-worn sails, having found that used by me nearly as good at the end as at the beginning of the voyage*. It prevents sails splitting and blowing away altogether, which would have been my case but for the Bands, the after sail having parted during a strong breeze. I think I need scarcely say how useful they would be if caught on a Lee Shore; therefore, invaluable for *Coasting Vessels*. I have, indeed, so good an opinion of the Patent, that I shall endeavour to persuade all my nautical friends to patronize it.

I remain, Dear Sir, your most obedient servant,
GEORGE RICHARDSON,
Commander of the *Herefordshire*.
* This ship has again returned after two India voyages, and Captain R. considers the sail yet of service to the ship.

London Docks, 17th December, 1845.

Messrs. TRAIL & Co.,

Gentlemen,—I am glad to write you a favourable opinion of your truly ingenious plan for protecting sails from destruction; in one or two instances it has been the means of saving those I had patented from blowing away. In my opinion, the proper time to apply the Bands is when a sail is fairly stretched, say, a quarter or half-worn, and although it would appear unnecessary at so early a period, yet it will be found, by experience, that the general wear of the sail throughout is materially assisted by the Bands relieving the main canvass from all strain. I conceive the great reduction you have made in the charge for application will, in a very short period, cause it to be generally adopted; such I trust will be the case, as I assure you, it in my opinion deserves; I shall make it my duty to recommend it to all my nautical friends, and shall be happy at all times to afford satisfactory proof of its economy and strength to any one you may refer to me for a candid and unbiassed opinion.

Yours, &c.,
G. FINLAY,
Commander of the *Traveller*.

On Board the *Tropic*, of Glasgow, London Dock,
July 14th, 1846.

Gentlemen,—Having fairly tested the utility of your invention, on my last voyage to Sydney, out and home, I beg to state that I consider it a most efficient plan for affording additional strength and security to sails; does, in my opinion, merit universal patronage.

CHARLES ROBERTSON,
Commander of the *Tropic*.
— WILSON, Esq., Owner.

To Messrs. TRAIL & Co.

Packet ship *Mediator*, St. Katherine's Dock,
25th July, 1846.

Messrs. TRAIL & Co.,

Sirs,—The trial I have made of your Patent has given me much satisfaction; have the goodness to send on board for two *Topsails* and a *Foresail*, and apply your *Protective Bands* to them. I consider it has been a great saving to the ship, you have, therefore, my best wishes for its success. Yours, &c.,
J. M. CHADWICK, Commander.

64, Cornhill, February 10th, 1846.

Dear Sirs,—I am happy to inform you the *Foretop-sail* patented by you for the *Seringapatam* last year, was bent from the time of her leaving England, up to the time of her arrival off the Cape of Good Hope, a space of nearly two months; and though we experienced some very heavy weather, and the sail was repeatedly reefed, still the Bands put on by you never gave way. I consider it a most excellent plan for sails half-worn, but do not think it will answer after they are so.

I remain, yours faithfully,
GEORGE GODDEN,
Commander of the *Seringapatam*.
Owner, R. GREEN, Esq., Blackwall.

Messrs. TRAIL & Co.

London Docks, May 6th, 1846.

Messrs. TRAIL & Co.,

Sirs,—It affords me much gratification to be able to write to you, a faithful and favourable report, as regards the great benefit I have derived from your *Patent Protecting Bands*, which were applied to my *Foresail*, and *Foretopmast Staysail*, done in the month of February, 1845. The sails were then about half-worn, and, with them set all the time, I have made a voyage to India and back, and I consider them well capable of doing as much more without requiring any repair. I am about to go round to the North, and shall certainly advise my owners to have the whole of my sails done. It is a first-rate invention, and has been a great saving to them. Such is the practical opinion of

Sirs, your obedient servant,
RALPH YORTON,
Commander of the *Thomas Metcalf*.

I am of opinion that *Trail's Patent* is a most excellent plan to protect a sail from destruction; but I think it ought not to be applied to a sail too far gone. The proper time for its application is when a sail has been fairly stretched, say a quarter or half-worn, but not after that state. I consider it a great saving on the general wear and tear of a sail, and should always consider myself safe under canvass so well protected.

WILLIAM HENRY PARE,
Commander of the ship *Malabar*.
Owner, R. GREEN, Esq.
Blackwall, May 7th, 1846.

St. Katherine's Docks, February 26th, 1848.

Messrs. TRAIL, CHASEMORE & Co.,

Gentlemen,—Having tested your Patent with *Corded Bands*, applied to my sails in August 1846, I feel much pleasure in being able to bear testimony to the great advantage they afford to Ship Owners, both as regards practical utility and economy. I have experienced a most trying voyage from London to Bahia, thence to Punta de Arenas and back, during which time we encountered much severe weather, and I am convinced that had it not been for the protection afforded by your *Patent* I must have lost my sails, and, consequently, have been placed in circumstances of very great peril as to the safety of both life and property. I feel myself bound to make this report in justice to the merits of your valuable invention, and be assured I shall use every endeavour to recommend, and likewise promote the advancement of a plan so well calculated in every way to benefit the maritime world. I am, Gentlemen, your obedient servant,
JOHN GOUDIE,
Master and Owner of the barque *Jane Goudie*.

July 16th, 1846.

Gentlemen,—I have fairly tested your Patent for the protection and strengthening of sails, and I am happy to state that the sails done by you for the *Angelina*, have given me every satisfaction, although they were in a very indifferent state previous to the application of your Bands. I certainly am of opinion that your invention justly merits patronage.

I am, Gentlemen, your obedient servant,
EDWARD GOLDSMITH,
Commander of the *Angelina*.
R. BROOKS, Esq., Owner.

London, August 24th, 1846.

Gentlemen, I have just returned from a voyage of fifteen months, having used, during the greater part of the time, the sails patented by you for the *Thetis*. I have great pleasure in giving my testimony as to the value of this invention, and consider it an effectual protection to sails in bad weather, and a great increase of durability in their ordinary wear.

I am, Gentlemen, yours,
J. CASS,
Commander of the ship *Thetis*.
— BURTON, Esq., Owner.

Messrs. TRAIL, CHASEMORE, & Co.

Prince's Dock, Liverpool, September 23rd, 1846.

Messrs. TRAIL & Co.,

Gentlemen,—The Mainsail that you banded has been now in use on board the *Diamond*, since July 1845, and, at the time it was patented, was rather more than in a half-worn state. I consider it a most effective plan for saving a sail from total destruction; as in one instance, during a gale, the bolt rope parted, and the sail was undoubtedly saved from going to pieces by the crossing of the Bands. I can with much confidence recommend the Patent as being a very good invention, and calculated to prove a great saving to Ship Owners, particularly in the fall of the season.

I am, your obedient servant,
THOMAS IRVINE, Commander.

Liverpool, September 20th, 1846.

Messrs. TRAIL & Co.,

Sirs,—When in command of the *Oxford*, about twenty months ago, I had two sails banded agreeable to your Patent, and was about ordering a new Foresail to be made, but considering your protection, if applied, would answer my purpose, I had the old one done, which has been in use ever since, and is even now serviceable to the ship as a summer sail. I am very much pleased with the result, and can with confidence recommend it as being an economical and good invention.

(Signed) JOHN RATHBONE,
Commander of the *Columbus*.

Newport, October 1st, 1846.

Gentlemen,—A vessel working down our river yesterday, came in contact with one of the British traders whose Mainsail I had banded; the sail was only kept from entire ruin by the Bands, the vessel's jibboom went through and through the Mainsail, passing over the Bands, which held firmly. After clearing the trader, she went on her way, the Bands keeping the sail in proper shape, though having many holes in it. With an ordinary sail she would have had to stop and repair it or get another, showing in this case the benefit of the cord sown therein.

Your most obedient servant,
JAMES N. KNAPP.

Hyde Vale, Blackheath, Oct. 28th, 1846

Gentlemen,—In answer to yours requesting my candid opinion upon the merits of the Patent Sails, supplied to the American Packet Ships *Westminster* and *Switzerland*. I have no hesitation in declaring, that I believe them to be a decided improvement upon the old method, from their very superior strength, a matter of the greatest importance under circumstances upon which the safety of the ship frequently depends. I speak thus with confidence, from having had the opportunity of testing their capability, under the most trying circumstances, in the *Switzerland*, on her passage from the Downs to Portsmouth, in July last; when, had not the old sails been adapted to your Patent, I have no doubt we should have had them blown away, and I should then have been unable to have accomplished the passage I then made; but, with them, I succeeded to the utmost extent of my expectations, nor have I found the least difficulty in either reefing or furling, from any additional weight they possess. In my experience of their use on board either of the packets supplied with them, I am only surprised they are not generally adopted.

I am, Gentlemen, yours very truly,

E. PASHLEY,

Pilot to the American Packets.

To TRAIL & Co.,

Patent Storm Sail Makers, London.

Leith, March 1847.

Gentlemen,—In reference to your Patent for banding Ship's Sails, I beg to state that at the time the

ship *Prince of Wales*, London and Leith Old Shipping Company's *Iron Clipper*, and which I had then the honour to command. Having heard so much said in praise of your Patent Banding, I sent a *Topsail*, 18 months old, to your Agents, Messrs. Gavin and Son, Leith, to be banded, 1846. From that time I have had it constantly bent, during a very severe winter; in a word, it has given me complete satisfaction. On one occasion, being obliged to beat round the *Fern Islands*, against a heavy gale of wind from the N.E., the sail gave way in three compartments, but the Bands continued as strong as ever, and I am confident, had it not been so banded, the sail would have shivered to atoms; and which has so fully convinced me of its utility, that I have now got all my principal sails done in the same manner, by your Agents; as, also, have all the ships in our employ. Having, therefore, tested the capabilities and advantages of your Patent during very severe weather, I can now with utmost confidence recommend it to the notice of Ship Owners and Captains, being fully convinced it will give the greatest satisfaction.

I am, Gentlemen, your obedient servant,
JOHN JORDAN.

Ipswich, April 30th, 1847.

The following Testimonial has been received from Mr. William Bayley, Ship Owner and Ship Builder, Ipswich:—

Having applied *Trail's Patent*, with Corded Bands, to a *Topsail*, of my barque *Courier*, in a letter just received from the Captain, he refers to it as follows:—“When I first went on board the *Courier*, the best *Topsail* was 18 months old, and I have had that set Winter and Summer (except on the passage from Naples) and never put five yards of canvas into it; it was only done over with *Trail's Patent* with the Corded Bands, when at home last time, in 1846, and has been used ever since. It is as good as if you had given me a new sail. At the same time the *Courier* had the *Topsail* Patented she had a new *Foresail*, it has been repaired, and now wants about 30 yards of canvas put into it, then it will not be so good by far as the old *Topsail*, to which *Trail's Patent*, was applied.” From the Captain's testimony and my own observation I am so satisfied with *Trail's Patent*, that I can confidently recommend it to Ship Owners and Masters, and I intend to have it applied to several more of my own vessels.

WILLIAM BAYLEY.

St. Katherine's Docks, August 18th, 1848.

Messrs. TRAIL & Co.,

Sirs,—Being now in London, and having had a *Jib* banded by your Agent, Mr. Jarvis, of Kingsbridge, I take this opportunity of giving you my opinion of the merits of your Patent. While going down Channel I had my *Jib* burst in several places, but the Bands bringing it up, I did not remove it, at the same time my other sails were being blown to pieces. I therefore intend having more of my sails done on this plan, being now fully convinced of the great utility of the invention. You will therefore, send on board for a *Foresail*, to be banded in your best manner.

I am, Sirs, your obedient servant,
F. W. HILL, Master of the *Dorcas*.

September 9th, 1848.

Messrs. TRAIL & Co.,

This is to certify, that I had two sails banded, viz:—a *Mizen Topsail* and *Spanker*, in June 1845; also, a *Fore Topmast Stay Sail*, in November of the same year, according to *Trail's Patent*, and, the way I have used those sails in blowing weather, I can fully recommend them to any of my Seafaring friends, as being a great support to a sail after it has been partly worn, for it seems almost impossible to blow sails away which have been banded after this principle.

J. C. NICHOLS,
Commander of the *Roger Sherman*.

Bideford, November 3rd, 1848.

Messrs. TRAIL, CHASEMORE & Co.,

Sirs,—I am happy to notice the many advantages of your Patent, having applied the Corded Bands to several of my own vessels, and have found them to stand when new sails have been blown from the bolt ropes. I patented two *Topsails*, for my barque *John*, and which has just arrived at New York. On her voyage out she encountered the hurricanes of the 24th and 28th of September last, when she lost her Mainmast. In a former voyage, the Captain stated that his banded *Topsail* stood, while a new one was blown away. I am, Sirs, Your obedient servant,

THOMAS EVANS.

Great Yarmouth, December 11th, 1848.

Messrs. TRAIL & Co.,

Sirs,—This is to certify, that I have had a very favourable opportunity of proving the value of your Patent with Corded Bands. It was introduced to my notice through the recommendation of your Agents, Messrs. Bradbeer and Son, of this port. Your Patent was applied to my *Topsail*, in December last; I have had it bent in the Mediterranean trade ever since, and it is still in good condition. The Corded Bands certainly afford great strength to half-worn sails, and I do

with much confidence recommend the patent as a very serviceable and useful invention.

I am, your obedient servant,
ROBERT HOGG,
Master of the Schooner, *Honour*, Gt. Yarmouth.

Leith, February 3rd, 1849.

Messrs. TRAIL & Co.,

Sirs,—I now take this opportunity of informing you that the sails you patented for the *Prince of Wales*, at Leith, in September, 1846, are everything I could wish, as regards the much improved way in which it is done, also the very great strength of the Corded Bands. In short, it is the greatest improvement I have ever seen for the protection of life and property, when caught on a Lee Shore in a gale of wind. Wishing you every prosperity with your valuable Patent,

I remain, Sirs, yours, most respectfully,
ALEXANDER BROWN,
Master of the *Clipper*, *Prince of Wales*, Leith.

West India Docks, August 1st, 1849.

Messrs. TRAIL, CHASEMORE & Co.,

Gentlemen,—I have great pleasure in bearing testimony to the great utility of your Patent, the Corded Bands supplied to the barque *Stratheden*, under my command, on a voyage from London and back to this port; during that time we experienced many very heavy squalls and gales, but I have never yet found, when a sail split, the bands even to give way. In my opinion it is a complete Patent, as it also prevents the chafing of the main cloths of the sail by the *Buntlines* and *Churlines*. I shall be very happy to recommend it to any Captain or Owner I may know, and to make a fair trial as I have done. In fact, the invention only requires to be better known, to be generally used, as a protection to sails.

I remain, your obedient servant,
FREDERICK TURNER,
Commander of the barque *Stratheden*.

“Brig *Lively*,” London Docks,
February 4th, 1850.

Messrs. TRAIL and Co.,

Gentlemen,—During the late Southerly gales in the *English Channel* I had a very good opportunity of judging of the merits of your Patent, and I can confidently state that it was the means of preventing the ship from going on a Lee Shore. If our Mainsail, *Trysail*, and *Foretopsail* had not been banded we should have lost them all, and most probably the ship. I can with safety recommend their adoption to half-worn sails, both for security and economy; and in future I shall never be without them. Wishing you every success in so valuable an undertaking,

I remain, Gentlemen, your obedient servant,
WM. HAMILTON, Commander.

Messrs. TRAIL & Co.,

Gentlemen,—The narrow-corded bands, placed on a half-worn Foresail of the “*Monarch*,” have made that sail serviceable for a much longer period than it otherwise would have been, and I greatly approve of them, as they not only strengthen a sail greatly, but should it split, I have never found it go beyond the band, and the sail therefore, kept as useful as before, and you could repair it at leisure.

I am, Gentlemen, your obedient servant,
CHARLES F. WELLER,
Commander of the *Monarch*,
June 13th, 1850. RICHARD GREEN, Esq., Owner.

London, March 27th, 1850.

Sirs,—I am happy to bear testimony to the great benefit I have experienced, from the use of your Patent, the following will show how very useful it has been to me, and the great security it affords in a severe gale. When on a voyage from Königsberg to Boston, the Mainsail split in the after leech, when the rope and canvas both gave way, but your bands stood the test. And again, in the *Catagat*, also at the mouth of the Humber, when blowing very hard from E.S.E. the canvas gave way, three different times, but was always stopped by the bands, and which certainly saved this important sail from entire destruction. I am happy to give this plain statement of facts, and hope they may be the means of removing a prejudice, which many masters have against your Patent. I think it a most valuable invention, and deserving of patronage.

I am, your obedient servant,
CHARLES GREEN,
Commander of the *Rover*, Gainsboro'.

26, North John Street, Liverpool, August 1st, 1850.

Mrs. TRAIL & Co.,

Gentlemen,—I have to state to you that I have used your Patent Bands on the vessels *Jane Erskine*, *Shamrock*, and *Meg Merelies*, and highly approve of your invention, it is an economical mode of rendering half-worn sails trustworthy, and I will be glad to avail myself of it whenever I have an opportunity.

I am, Gentlemen, yours truly,
JAMES JACKSON.

TRAIL'S PATENT STORM SAILS.

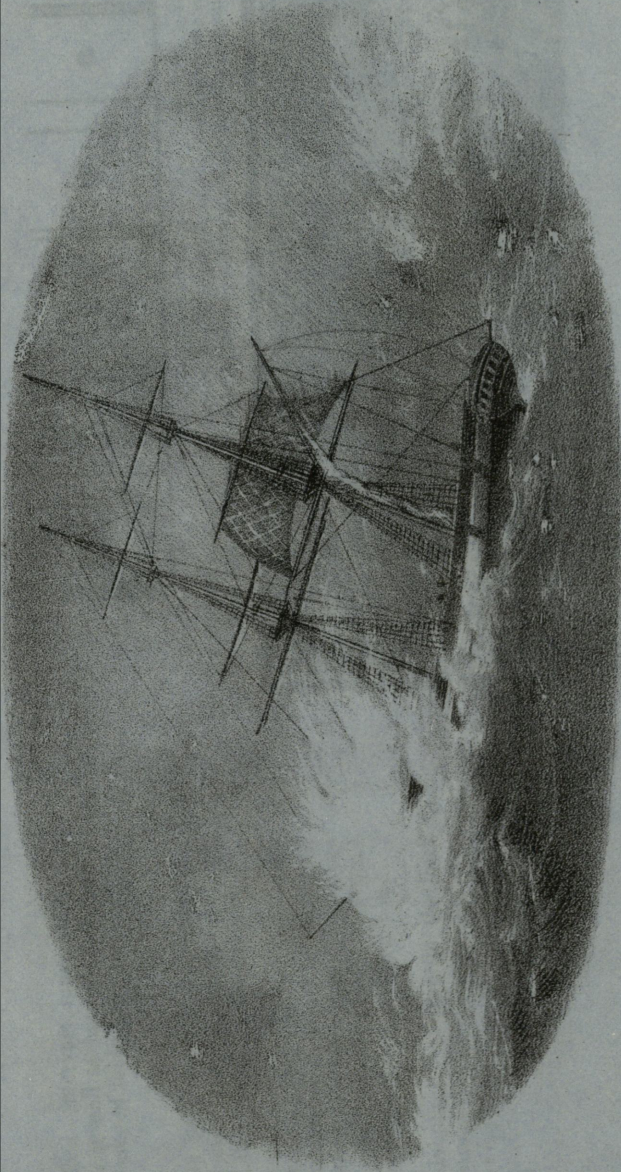
CAUTION.—As in an action for infringement, tried before a special jury, in the Court of Queen's Bench, in November last, a verdict was given in favour of the Patentees, with damages carrying costs of suit,—This is to give Notice, That persons making or banding sails on Trail's principle, without the special license of the Patentees, or otherwise infringing the Patent Right, will be prosecuted as the law directs. All persons applying Bands to sails upon Trail's plan, such Bands not having been purchased of the Patentees, and sent direct from their Office, will be guilty of an infringement.

Orders received at their Offices, 8, Upper East-Smithfield.—Sail Lofts, Miller's Wharf, Lower East-Smithfield.

AGENTS are appointed for the PATENT, at all the Principal Ports in the Kingdom.

LONDON:

PRINTED BY T. BRETTELL, RUFERT STREET, HAYMARKET.



Barque "Union" London Docks,
August 13th, 1847.

Gentlemen,

I have much pleasure in handing you a sketch of my Brig "Traveller" (Capt. W. Austin), during the very heavy gale of last December, on the edge of soundings of the English Channel, fully justifying my former unbiased opinion of your most valuable Patent. You will observe the vessel was lying to under a close reefed main-top-sail-patented, and it blew so hard as to destroy every bit of the sail with the exception of the rope & your Patent Stanks, which kept and made sufficient sail to keep her by the wind, as is proved by the tremendous sea which dashed her. Striking on the Beam, which had it struck her Broadside, she must have foundered; which has strengthened my judgment exceedingly in favour of your inestimable Patent.

I remain

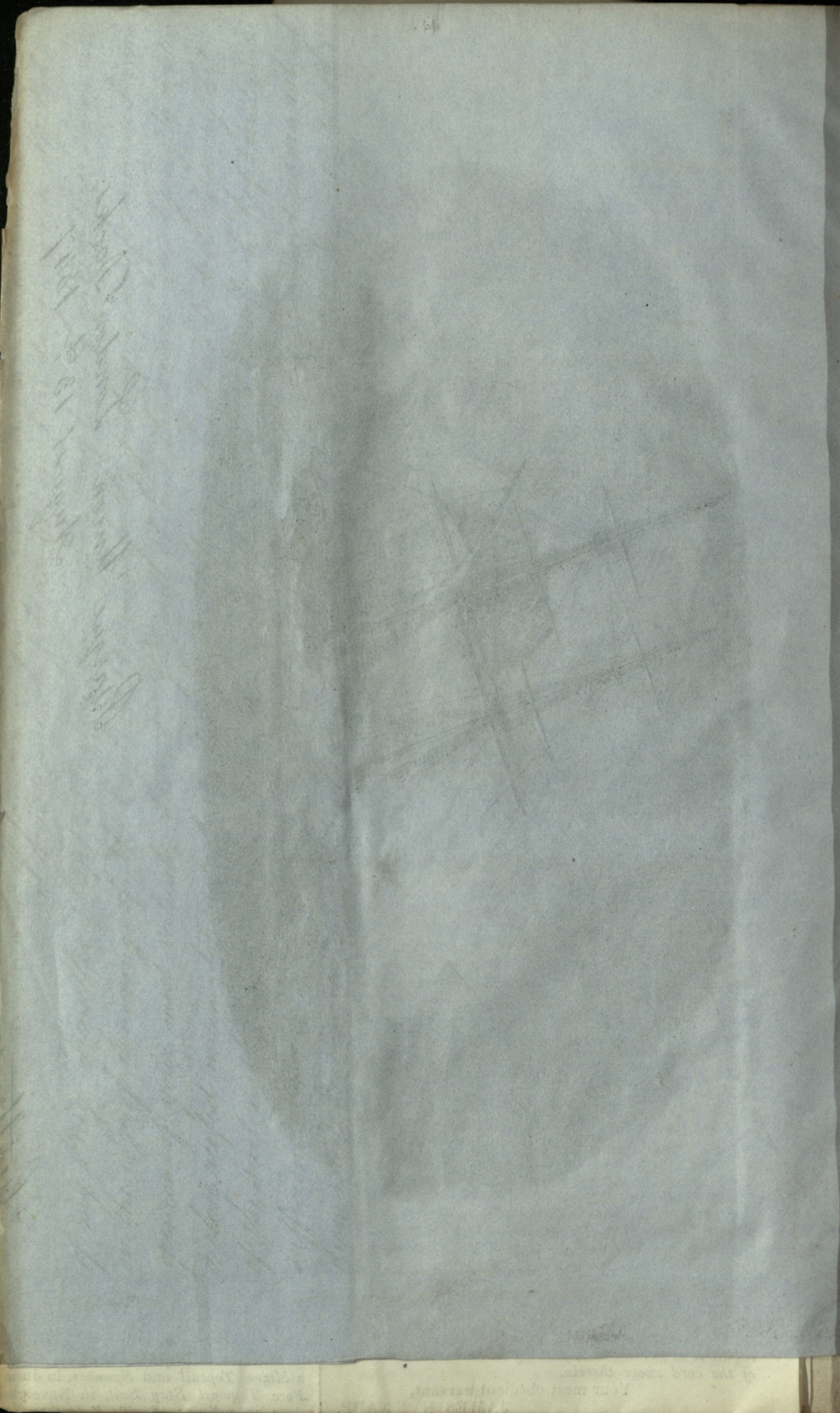
Gentlemen,

Your obed^t Serv^t,
G. Finlay.

Master of the "Union" of London.

to

Messrs. Fairbairn, Chasemore & Co.
London.



Description and Sketch

OF THE GEOMETRICAL FLOATING LIFE-BELT, OR LIFE PRESERVER

HAVING PROPORTIONATE COMPARTMENTS,

Made of a little more than $1\frac{1}{2}$ yard of the stoutest Sail Canvass, folded lengthwise—divided into five compartments, by four transverse double rows of stitches (Fig. Z). The whole very tightly stuffed with at least sixty ounces, full weight, of cork cuttings (Fig. I).

From the particular proportions of the different widths of the compartments, *a b c a* this life-belt can be folded up so as to acquire a small and almost geometrical form (nearly a cube, of about eleven inches in size, Figs. II, III, &c.) ; which circumstance makes it useful as a cushion, or as a little stool on board ship (according to the way in which it is put down).

Its division in compartments presents the following other advantages:—1st. If, from being violently dashed against rocks and other substances, one of these compartments should be torn, the remainder would still continue to constitute a useful belt. 2nd. From the flexibility of the canvass between the aforesaid four double rows of stitches (forming four unstuffed intervals), the whole surrounds the body of the wearer comfortably and closely (Figs. III, V), leaving the movement of his arms free, and all naturally on the wider of these unstuffed intervals, that is, between the first and second, and between the fourth and fifth compartments. 3rd. It is quickly put on, in consequence of the large noose, *d d*, formed by a double fastening of a very strong linen tape, through which the wearer begins at once to pass his head, before tying the longitudinal tapes, *e e*, round the waist.

This noose gives great celerity to the operation: a very important thing in case of shipwreck. The life-belt protects, of course, the chest, the sides, and the back of the wearer, against violent shocks.

N.B.—The different letters of the sketch show the manner of folding it up, &c. &c.

These cork cuttings are small irregular bits.

Observations.

It is obvious that the upper edge of the belt is the seam of the selvages. The canvass is of the kind used for the largest ships, and 2 feet wide (before it is folded lengthwise).

The stoutest sail canvass has the twofold recommendation of better resisting the violence of shocks, and that, being very durable, the life-belt can be resold with little loss.

New ones can be made at about three shillings and a half a-piece, including canvass, cork cuttings, tapes, tar-twine and making; so that if the article here mentioned is sold for about three shillings at the termination of the voyage, the cost is reduced merely to some pence.

On board of emigrant ships, where so many of the passengers cannot swim, these belts would be particularly useful.

The aforesaid wider unstuffed intervals must evidently be between the first and second, as well as between the fourth and fifth compartments, for the sake of folding up the belt compactly.

It has been suggested that the belt ought to be varnished, which all in all would probably not be an improvement; the varnish concealing defects, and the quality of the canvass.

If the tape, *d d*, forming the noose were, by its two ends, only sewn to the belt, their stitches might easily be damaged, and that essential noose would soon become useless. To secure them firmly, they are not only sewn on, but each end goes round the belt itself, and makes upwards a double knot *n*.

These knots have also the advantage that even in the dark the upper side of the belt is immediately felt; and as shipwrecks happen often during the night, it is very important to lose as little time as possible.

Those two parts of the tape *d d* (which go round the belt at the unstuffed intervals between the second and third, and between this third and the fourth compartments) must on no account flap, as they might get hitched. Those parts must therefore be carefully sewn to the canvass all along these intervals, and through both sides of it, and the stitches must begin from each angle of the tape, so as to leave no corner that could hitch. This tape, *d d*, must decidedly be very strong, of the sort called linen web, two inches wide, and of the stoutest quality.

For the sake of celerity in undoing the belt in case of need, the two waist tapes, *e e*, as well as the noose *d d*, put inverted upon them, must be placed and extended quite loosely in the inside when the belt is folded up in the compact cubical shape (Fig. VI). But it follows, that it could not maintain this form of itself, and therefore two short bits of tape, *s s*, are sewn to the intervals between

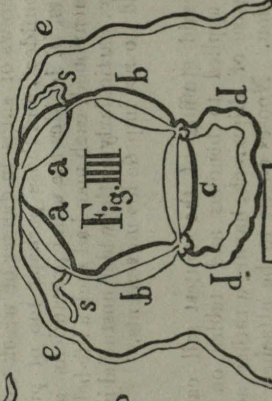
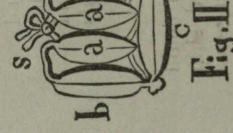
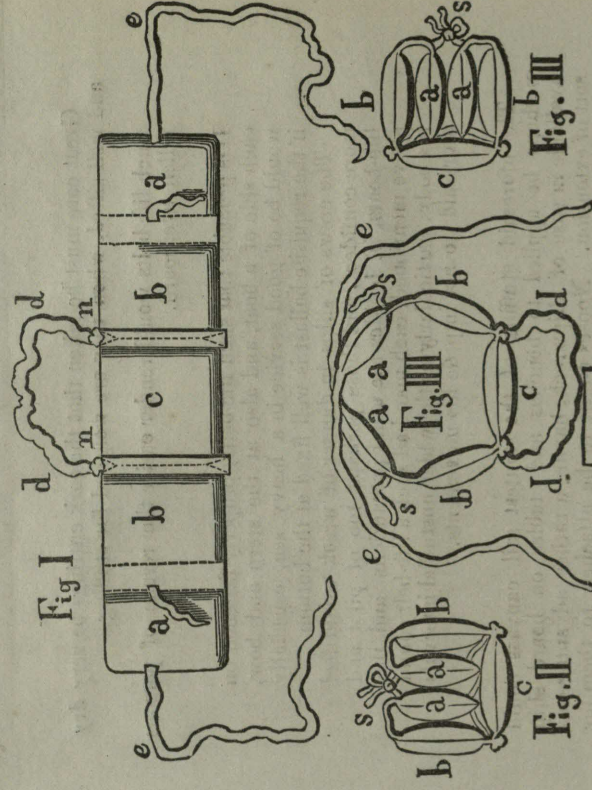


Fig. V

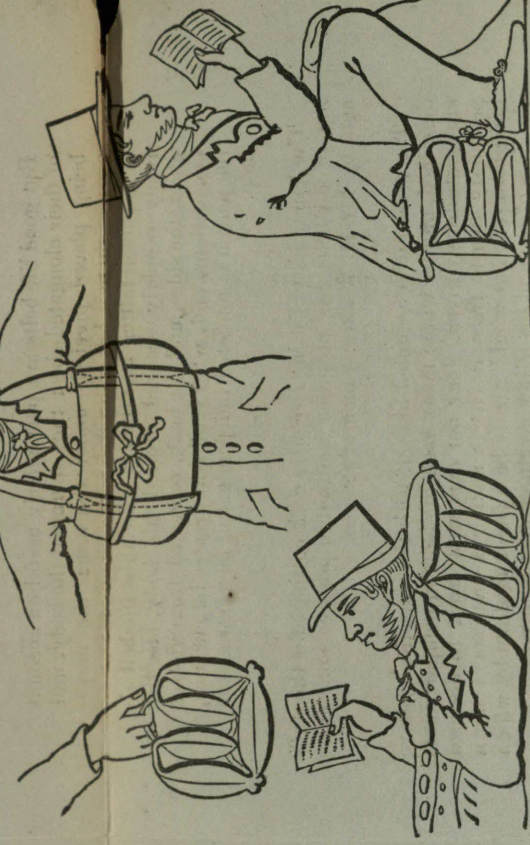


Fig. VI.—Manner in which the waist tapes and the noose must be put before folding the Belt in the compact cubical shape. The noose is thereby directly at hand in unfolding the Belt—a very important precaution.

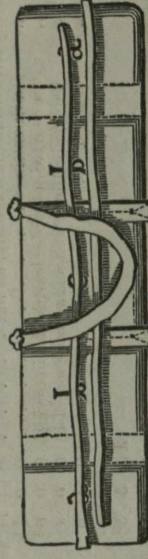
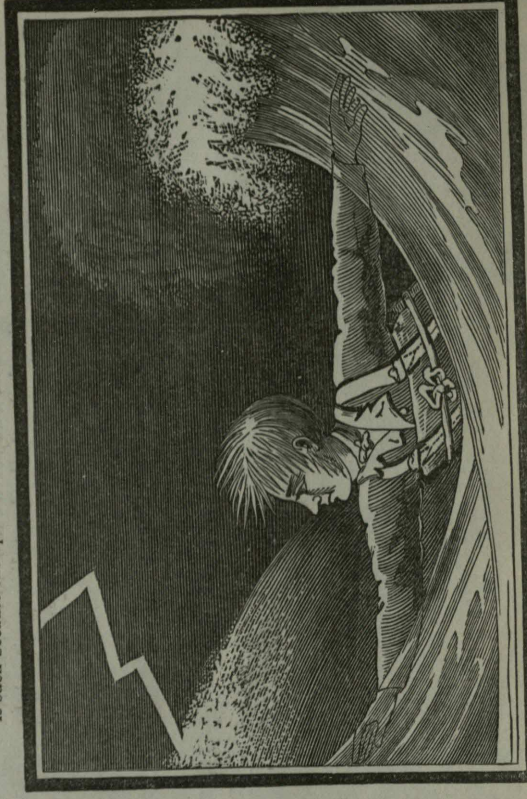


Fig. Z.—Dimensions before the canvass is stuffed (these are the smallest dimensions for the purpose).

a	b	c	b	a
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The $\frac{3}{4}$ of an inch marked at the corners is the turning-in of the canvass for the end seams, and it is such because the operation of stuffing presses much against the extremities.



the first and second, and between the fourth and fifth compartments, which, tied together, keep the whole compactly in that shape (Figs. I, II, III, IIII).

Instead of these bits of tape, *s s*, there could be a short strap and a buckle; but that would augment the expense, and add a dead weight to the belt.

The end of one of the waist tapes could be provided with a wooden coggle, and the end of the corresponding one with some loops, so as to fasten them by this means instead of a tie.

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B. 24.

Great care must be taken that the cork cuttings be very dry and well sifted, when they are weighed for stuffing.

Such life-belts would render easier the rescue of persons fallen overboard.

It is probable that such life-belts, properly fastened on each side of a boat, and also at the stern and bow, would be of good service in a heavy sea, especially if the requisite ballast is well fixed at the bottom.

The crews of ships in danger of wreck would feel more confident, and those perhaps too of pilot and life-boats, if, besides the usual precautions and this above mentioned, each man had such a life-belt round his body, particularly as the wider unstuffed intervals aforesaid do not impede his movements.

The aforesaid stuffing of the stoutest sail canvass could perhaps be applied to benches and tables on board ship available in case of shipwreck, having a rather advantageous sort of extension. Nooses ought to be attached to them for passing the arms through, to get hold. These nooses must be very strong and well secured, and ought to be stuffed with cork cuttings for the following threefold reason:—of floating on the surface of the waves—of remaining wide open—and of being caught and grasped with less difficulty.

But good life-belts are particularly useful on account of their elongated size; they surround the body, and being placed precisely under the arms, the movement of those who are in the arms is free and unconfined.

A person falling into the sea with this life-belt already properly secured around his body, has the chest, the sides, and the back, protected from violent concussions, and, what is of still greater importance, the person is rendered independent of any extraneous help.

The happy idea of using irregular cork cuttings for the stuffing of life-belts was proposed and put in practice some years ago, by Mr D. Walker, a man of science.

The person who occupied himself with the variations above described, and by whom many such life-belts in compartments are gratuitously given, does not expect or want to derive a pecuniary benefit from it (he is neither a tradesman nor a manufacturer), but would gladly be a feeble medium by which the lives of some of his fellow creatures may be saved.

The items of the expense for a life-belt of the above description are—

	£	s.	d.
For the sail canvass, best quality, all flax	0	1	11
" cork cuttings	0	0	1½
" best tar twine (used at least double in sewing)	0	0	0½
" tape (called linen web, and as above specified)	0	0	4½
" making	0	1	0
	£0	3	5½

N.B.—To a manufacturer, the real cost would perhaps be somewhat less. This sort of work does not require any nicety, but essentially to be made very solid.

The price of the cork cuttings depends chiefly on the number of cork-manufactories which may be in the neighbourhood, and the above price has been specified, it seems, as an average one.

It is thought prudent to enforce the observation that any object destined to float, and particularly a life-belt inflated with air, would become dangerous, subject as it is to be rendered quite useless by the smallest hole, or the least damage it might easily receive, and thus, just at the moment its service is required, it would deceive the expectation.

Observe that no expensive or special tools are necessary for the making of these life-belts, but only twine needles—an object to serve as a substitute for the thimble,—and a bit of wood about one foot long (smooth so as not to injure the canvass), fit to compress very tightly the stuffing of cork cuttings.

Special Annotations.

Great care and trouble have been bestowed as to the quantity of cork cuttings (at least sixty ounces, full weight), and the size of the belt, taking in account many circumstances which may be imagined by persons who have encountered heavy storms at sea, &c.

For any additional weight a passenger may wish to carry in any way about him, an equivalent buoyancy must of course be given to the belt. A flat bag of the same canvass, stuffed with about twenty ounces of such cork cuttings,—(as a sort of little cushion represented in Fig. Y below),—or bits of the bark of cork,—can easily be well secured to the front compartment.

A very serious consideration on behalf of life-belts is, that shipwrecks most frequently happen on a lee shore, beset with rocks and shoals, so that a person escaping from a wreck is almost sure to be dashed violently on the coast by the fury of wind and waves; thus the life-belt may be injured at one of its points and cork cuttings escape although divided in five compartments, which divisions diminish the damage: otherwise the danger would be still greater.

This violence to which the belt may be exposed, renders absolutely necessary that all the materials composing it, &c., should be of the very best and strongest.

A life-belt is not an agent for teaching the art of swimming, but ought to be a valuable means of saving human life endangered under the most appalling and frightful circumstances; unhappily of too frequent occurrence.

One cannot sufficiently inculcate, that for any person who falls, or jumps into the sea in case of shipwreck, especially such who cannot swim, it is far more advantageous to be kept afloat individually and alone, amidst the agitated waves, than to be obliged—in the day-time or in the dark,—to grasp at hazard, and then to cling with others to some buoyant object, not only for hours, but perhaps for days, and with the certainty of drowning if the hands let go their hold for a moment.

It is proper to observe, that many persons might hesitate or feel rather ashamed to carry on deck an object exclusively a life-belt, should no imminent danger be apprehended, though to a certain degree existing, in consequence of fog, gale of wind, or vicinity of shoals, &c. But no such hesitation need be felt regarding this species of belt, as it can serve for a stool, &c., and the precaution of having it at hand would probably save its possessor's life in case even of sudden shipwreck.

The cork cuttings which were used for many such life belts were bought at a Cork Manufactory. These cuttings are the remnants of the cork bark, which fall off in making corks for bottles, &c., and are of a proper size, not being too small. The quantity of them for the stuffing of a whole belt cost only about one penny and a half.

The parts of the noose which go round the belt can be folded lengthwise before being sewn to the belt, instead of being sewn on to it flat.

The two waist tapes could be made shorter, so as to be tied behind instead of in front: by which means the expense would be somewhat diminished, and the tie perhaps be done still quicker.

The stuffing with the cork cuttings must decidedly be made very tight and be well compressed for several reasons, amongst which to avoid the penetration of water.



Fig. Y.

Additional floating cushion, in case of a special additional weight.

